FOOD MANUFACTURE

ONARD HILL LIMITED, 17 STRATFORD PLACE, LONDON, W.1 MAY 1, 1952

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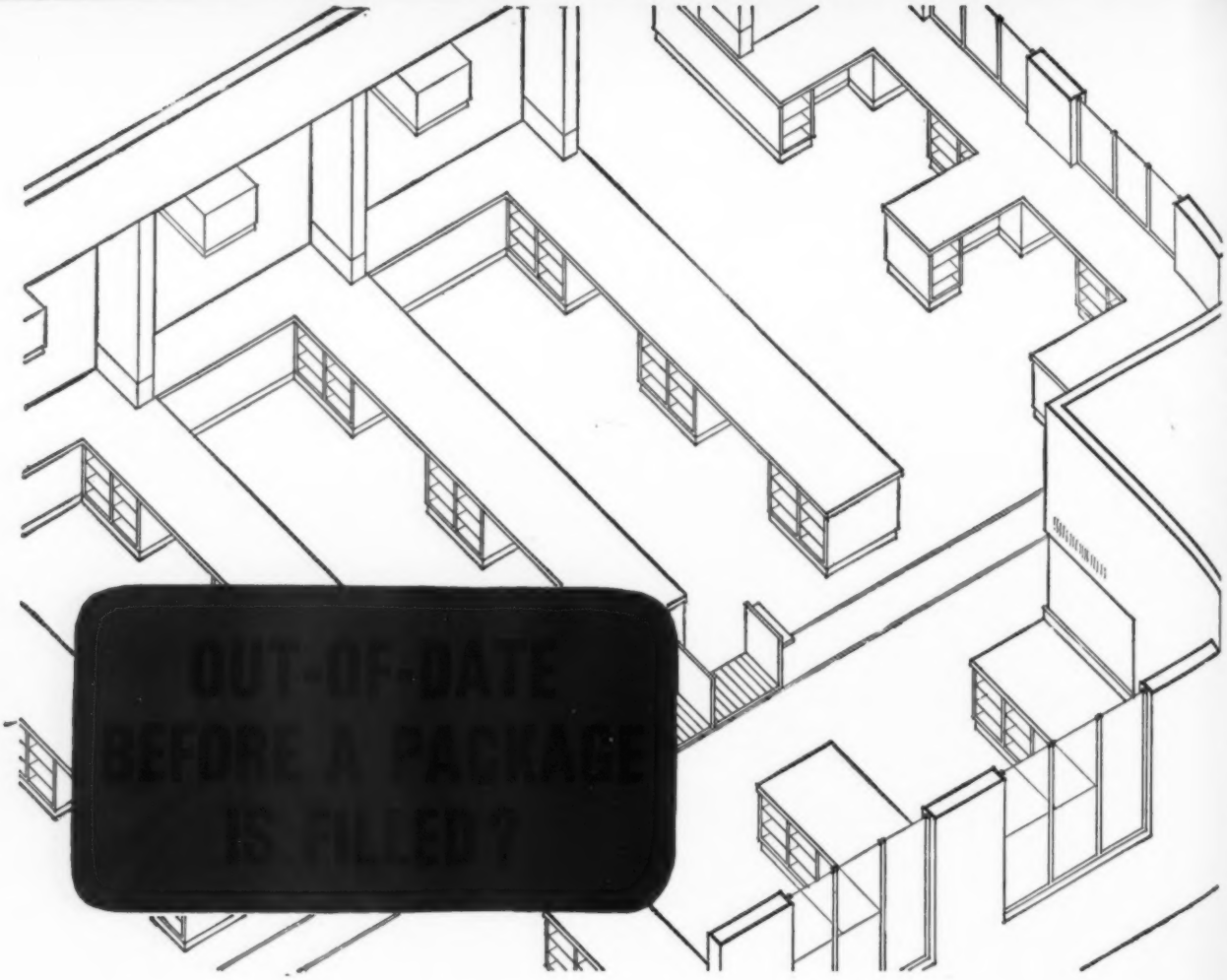

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FOOD MANUFACTURE

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FOOD MANUFACTURE

Vol. XXVII, No. 5 May 1, 1952

More Sugar per Acre

AMONG the thousands of acres of sugar beet grown in 1952 will be some trial fields devoted to new varieties bred in Sweden by the Hilleshog Sugar Beet Breeding Institute. In the complex language of plant geneticists, these are new kinds of beet made possible by polyploidy, or the artificially induced increase in the number of chromosomes in plant cells. Swedish tests have shown that these new varieties or strains give 5 per cent. more sugar per acre than the best previously known types. This figure is only an average one; in some cases a 10 per cent. increase has been shown.

It is not expected that the new variety will automatically adapt itself to British conditions. Some further breeding, probably involving crossing with normal British strains, may be required. If so, it will not be until 1954 at the earliest that the trials of a British polyploid sugar beet can be started.

In view of the fact that this type of plant breeding involves a disturbance of naturally evolved genetic balance in plant species, it is to be hoped that greater susceptibility to virus disease is not also produced. There is quite enough trouble already with the attacks of sugar beet virus.

Chemicals and Food

THE controversy about chemicals in or on foods has raged with greater intensity in the United States than in Great Britain. At a conference held in New York this year the opinion was expressed that, while protective legislation was required, much of the public attack upon food chemicals had been exaggerated. No single death was reported by the Food and Drug Administration from 1939 to 1947 as a result of the proper use of food chemicals.

The statistical weight of the food chemical risk may appear insignificant, but against this argument must be placed the great rise in synthetic chemical research and development; no one can rightly plead that the use of food chemicals during the aforementioned period accurately forecasts the use of these substances in the future.

Manufacturers contend that new legislation is unnecessary and that future research would be severely hampered. The Bill drafted by the Food and Drug Administration, the so-called Miller Bill, requires the producer of a food chemical to prove to the Administrator's satisfaction that his product is safe when used according to the producer's clearly stated recommendations. If the Administrator is not satisfied, permission to use the chemical will not be granted, and the manufacturer may either carry out further research to establish a case for safety or demand a formal hearing with further right of appeal to the courts.

Opponents of this projected Bill argue that the responsibility placed upon the Administrator is too great and holders of this office must inevitably adopt a negative, "playing-for-safety" attitude towards any new product. Research workers' efforts will be directed towards pleasing the Administrator instead of using their own judgment. "The judgment of a single man would be substituted for the free judgment of thousands and tens of thousands of research men throughout the country."

This last quotation perhaps exaggerates the issue. There may ultimately be a final FDA decision resting upon one individual, but his views will be based upon the judgment of his large and experienced department; even in the United States can there be tens of thousands of research workers engaged in studying food chemicals? Nevertheless, the issue is real enough. If there is not to be much wider State control, the public must feel convinced that food industry scientists are indeed exercising free and collective judgment and that they are at all times considering the toxic risks of food chemicals.

Progress in the Citrus Fruit Industry

Two technical developments in the citrus fruit industry may enhance its future economic background. One is a new French machine, recently described by Roger Schwob of the *Institut des Fruits et Agrumes Coloniaux*, Paris, that extracts essential oils from the skins.

Essential oils, used in food seasoning and the perfume industry, have formerly been extracted by crude hand pressing or by water extraction methods. It is claimed that the new machine (one is operating on a commercial scale in Morocco) will extract the oil from oranges, grapefruit, or lemons, leaving the fruit intact for further processing. The rate of handling is 4,200 fruits per hour, the "de-oiling" of an

individual fruit taking about seven seconds. Speed is not important solely from the viewpoint of productivity; the quality of the oil obtained depends considerably upon the rapidity of extraction.

News of the second development, which is also in commercial use, comes from California, where the University's Citrus Experiment Station at Riverside has found that by spraying lemons with a plant hormone substance before they enter the packing house, their storage life can be lengthened by about 50 per cent. The two most successful hormones are 2,4-D and 2,4,5-T, both already well known as selective weed killers. At appropriate spray strengths, however, they keep the button end of the fruit alive and this appears to delay the onset of deterioration.

Any extension of the storage life of the lemon should benefit both the industry and the consumer. Losses in store have long been a troublesome overhead charge.

Strawberry Breeding

STRAWBERRY growing in the United Kingdom has been much handicapped of recent years by the incidence of disease. The steps which have been taken to control these diseases by the Scottish Horticultural Research Institute are described in an article by Robert D. Reid in the March issue of *World Crops*. It is obvious that such work is of paramount importance, not only from the point of view of the trade in fresh strawberries, but also from that of the jam manufacturer and fruit canner.

The author gives an interesting account of the attempts made in the period following the first World War to secure control of the Red Core Root Rot; this was the main cause of losses which occurred in the West of Scotland, where intensive strawberry culture became almost impossible.

In 1933 a systematic programme of breeding was started, and continuous work on the production of resistant varieties has been conducted to date. The conclusions drawn from a large number of experiments are that new strains capable of infecting resistant varieties may arise at any time if environmental conditions favour rapid development of the pathogen in the soil, but that the specialised strains, capable of infecting one resistant variety, do not automatically attack other resistant varieties, neither are they generally more virulent than existing strains. Each breakdown of a resistant variety acts in a manner similar to a new outbreak of the disease.

Experience has shown that by prolonging the time before infected land is re-planted, the risk of breakdown is greatly reduced. This procedure, coupled with the use of resistant varieties, makes strawberry cultivation possible even on heavily infected soil.

In the course of his article, the author enumerates the problems facing the strawberry breeder and describes how they are being tackled at one centre. Efforts are being made to produce commercially acceptable varieties possessing factors of resistance to the known new strains of the pathogen and ripening at various seasons, so as to provide varieties earlier and later in ripening, thereby extending the picking season.

Part Payment "on the Nail"

A SIGNIFICANT move has been adopted by some suppliers of heating and ventilating equipment who are seeking, and for the most part getting, an 80 per cent. down payment on their contracts before delivering the goods. The remaining 20 per cent. is paid when the job is completed and operating to the satisfaction of the buyer.

The effect of this arrangement is to prevent the customer from using suppliers of equipment as bankers by ordering plant and deferring payment for it on some pretext or other over a period of months, in the meantime making use of the goods. By demanding an 80 per cent. down payment before plant is delivered, the suppliers are assured that they can meet their own debts.

The move was started by the larger firms and is being welcomed by the smaller ones with fewer resources. The result is that a tight and sound financial position is achieved, firms are maintained on a solvent basis, and a true standard of requirements and commitments is established, based on known capacity to pay.

The possibility that such a system might be adopted in other spheres is of interest. In the refrigeration field "outstandings" are a severe headache.

One firm reported this month that it had still a twelve-month-old account owing from a farmer. The reason for the delay was that his farm was not yet linked to the power lines; until he actually had the electrical unit working it was not "installed" and would not be paid for.

In cases like this, the adoption of an 80 per cent. advance on deliveries appears doubly attractive. There may be many reasons for avoiding such a move, but the fact remains that it is working successfully in at least one walk of industrial life.

Liqueur Chocolates

AS a result of the successful prosecution of a manufacturer of "liqueur" chocolates which contained a non-spirituous flavoured syrup, mention of which was made in the February issue of FOOD MANUFACTURE, the Ministry of Food has been in consultation with the association representing chocolate and sugar confectionery manufacturers about descriptions to be applied to these products.

The bulk of such products on sale in this country

is probably foreign and the importers are not always known to the Ministry, nor would discussions with home manufacturers have come to their notice.

In a recently distributed circular, the Ministry has expressed the view that it would be preferable if the use of the word "liqueur" in the description of products which contained no alcohol were abandoned altogether; but the manufacturers, while acknowledging that the unqualified employment of the word was open to criticism, pressed for some latitude in describing their products so long as the purchaser was not misled. The Ministry finally agreed that these articles should be described "imitation liqueur chocolates," provided such description were followed immediately by the word "non-alcoholic" in substantially the same size type.

It is hoped that the food and drugs authorities will subscribe to the use of the proposed description. The trade association has advised constituent members to accept and apply this description in future, but has pointed out to the Ministry that it may be some time before stocks already wrapped and in distribution are cleared. The Ministry appreciates the difficulties facing manufacturers and in the circumstances suggests that food and drugs authorities will allow a reasonable time to elapse before considering proceedings on samples found in their area still bearing the old description "liqueur chocolates."

Growth of Table Poultry Industry

THE creation of a table poultry industry in Britain which employs modern methods of processing, grading, and presentation was slowly developing, according to Mr. R. Chalmers Watson, who is playing an active part in the development of the British Turkey Federation organisation.

The need for vastly improved marketing methods was stressed. Birds must be packed in standard quality grades, deliveries must be regular and on tap, and grading must be to within half-pounds.

These views are interesting in that they come from one who has recently visited the U.S.A., and who has consistently worked for the development of a modern poultry industry in Scotland.

Whether factory units can be established on the American lines or whether the packing stations can be organised to handle birds are questions which can be answered only as the development matures. The essential thing is that producers are realising the need to ensure better quality production and better marketing than have applied in the past and are working steadily, if slowly, towards that end.

Already, ten thousand head of poultry are being processed each week in Scotland's first poultry processing plant established two years ago at Fraserburgh.

About 85 per cent. are hens, but efforts are being made to encourage expansion of the broiler industry —chickens from 3 to 3½ lb. reared specially for the table.

The birds are mechanically plucked, cleaned, and processed. When immediate demand drops, the birds are quick frozen and held in store. The poultry unit was established against the background of the allied fish freezing and processing plant started six years ago, but is rapidly assuming its place as an entirely separate unit.

The major part of the processed poultry is sent to hotels and catering establishments throughout the country. Institutions and hospitals are also heavy users.

The success of this unit is interesting in view of recent N.F.U. plans to formulate a table poultry marketing scheme for Scotland.

Possibilities of Ion-Exchange

ION-EXCHANGE materials and processes have improved so much during recent years that the technique has acquired the status of a chemical engineering unit operation with a considerable number of applications outside the field of water treatment for which it was originally developed.

In the course of four articles, the first of which has been published in the March issue of *Manufacturing Chemist*, Dr. T. R. E. Kressman will review the most notable of these newer applications and outline the progress made in established uses of ion-exchange. In the first article he discusses the separation of rare earths and fission products, the purification of dyes, and reviews recent outstanding work in the fractionation of amino acids which has enabled these to be separated on a comparatively large scale.

In the next instalment of the series the author will discuss the use of ion-exchange in chemical analysis.

The Tortilla

SURVIVING the rise and fall of several civilisations, the tortilla has persisted in Mexico, with very small modifications, in the same form as in the days of Cuauhtemoc and Cortes, being prepared by the overnight steeping of dried whole maize kernel in heated lime water, after which the swollen kernels are drained and ground in a small mill. Dough of the proper consistency is obtained by the addition of small amounts of water during milling. The tortilla is cooked by placing it on a hot grill, where it is baked for a few minutes.

After 400 years, the tortilla is to be brought up to date. The Armour Research Foundation of the Illinois Institute of Technology has conducted researches into the possibility of preparing a stable flour for its manufacture, the condition being that the

tortilla prepared from such flour should be identical in taste with the standard domestic product. The flour would overcome the short keeping period of the dough as sold in the markets, in addition to augmenting its nutritional properties.

After alternative methods of preparation had been studied, dehydration was selected, canning and freezing having been rejected on the grounds of cost. Preliminary trials were made in a pilot plant, which enabled 500 tons of material to be put on the market. Its acceptation by the Mexican public was such that large scale production is now being organised.

This is an example of a daring experiment involving the risky task of changing the age-old food habits of a people.

A.C.T.H. Production

DURING the year ended June 30, 1951, the National Research Development Corporation, according to the report and statement of accounts, assisted in arrangements for the collection and allocation of animal pituitary glands for the manufacture of adrenocorticotropic hormone.

Following discussions with the Medical Research Council and the Ministries of Food and Health, the Association of British Chemical Manufacturers, and the industrial firms primarily interested, a special pituitary gland allocation committee was established with representatives of the Corporation providing a chairman and secretarial services.

As a result of this collaborative effort, gland collection from abattoirs has been very substantially increased and contracts for supplies of the hormones are being placed by the Ministry of Health. For the time being all the British-made A.C.T.H. thus purchased will be allocated to the Medical Research Council for clinical research work.

Natural Spices as Antioxidants

THE antioxidant properties of 32 spices have been examined by J. R. Chipault, G. R. Mizuno, J. M. Hawkins, and W. O. Lundberg (*Food Research*, **17**, 1, 46). With the exception of one sample of ginger, the ground spices in all cases exhibited an antioxidant effect on prime steam lard when tested by the active oxygen method at 98·6°C. Rosemary and sage exhibited particularly pronounced antioxidant effects.

Petroleum ether-soluble and alcohol-soluble fractions of these spices, with few exceptions, did not exhibit antioxygenic activities as marked as those of ground spices when employed at equivalent concentrations. However, some of the solvent fractions were decidedly active, although in some cases the highly potent antioxidants appeared to be present in the ground spices in quite low concentrations.

Citric acid exerts a synergistic effect on the antioxidant properties of some spice fractions and no effect on others.

In general, the antioxidant activity of the spices in pie crust was considerably less than in lard, owing probably to a partial destruction of antioxidants during baking. The antioxidants of some of these spices appeared to be less susceptible to destruction by heating than those of other spices.

Fractions containing the predominant antioxidants of sage and rosemary do not contain the characteristic odour components of these spices; conversely, fractions containing the odour components exhibit little antioxidant activity.

Prune Protagonists

THE pros and cons of prunes have once again come up for an airing in the columns of *The Times*. In the cause of economy, Lady Shrewsbury appeals for dried prunes instead of the more costly imported canned product. "A convenient form of childhood diet . . . to be produced two or three times a week. . . . An essential to baby's health": such are her ladyship's points in seeking to sweep canned prunes from the market.

Now Mr. Victor Cunard enters the lists as one who suffered from prunes in boyhood. "Prunes are responsible for more weeping and gnashing of teeth round nursery tables than any invention of English cooking," he maintains. He goes on to "the natural revulsion these tasteless and stringy fruits inspire in the young, overcome later in life for masochistic or purely medicinal reasons." If Mr. Cunard is right, their enforced absence from our tables will mean happier childhood and encourage visitors from overseas.

No fruit has had more said against it than the poor prune. Literary allusions to it are, in the main, adverse, if we ignore Walt Mason's: "Why taste the wormwood when the prunes are wholesome, sweet, and cheap?" and Dickens with his "prunes and prisms" merely designed as lip movement. Don Marquis in "Tristam and Isolt" opens the attack with: "Alas! That such a Peach should marry such a Prune." As for the Bard of Avon, his lines often enough cause us to wonder at poor prune's low status in his day. There are "dishes of stewed prunes" and "pounds of prunes" in "The Winter's Tale" and in "The Merry Wives of Windsor," and Falstaff's jeer: "There's no faith in thee than in a stewed prune." In the Second Part of "Henry IV" our William warms up with: "Hang him, rogue! He lives upon mouldy stewed prunes and dried cake."

If anyone should collate the literature on the prune, it would probably support Mr. Cunard and his adherents.

Guavas in Syrup

Prafull H. Bhatt, B.Sc.(Agri.)Hons., M.Sc.(Oregon).

One of the latest additions to the wide range of canned fruits and vegetables supplied by the Pure Products and Madhu Canning Company of Bombay are guavas in syrup. The canning section of this company, who have pioneered India's canning and confectionery industries, has been in operation since 1939 for the handling of mango products, but as the Indian mango season is so short, new products had to be introduced to cover overheads and find employment for the factory staff throughout the year.

AMONG the fruit and vegetable products of this company, who supply the requirements of the Defence Services of India, are canned oranges, papayas, and curried vegetables of different varieties, the production of which is the outcome of considerable research.

Several varieties of jams and jellies, using indigenous fruits, are also produced, as well as fruit squashes and crushes.

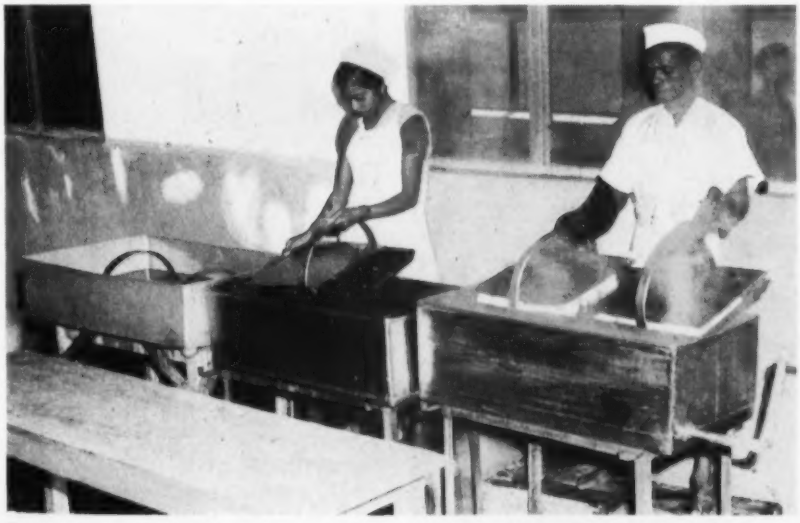
In view of the difficulties of importing pectin from the U.S.A. and other sources, the company have also conducted research into the utilisation of Indian sources of that substance from indigenous fruits.

Washed guavas are arranged in stainless steel basketlike trays and covered with a perforated lid, also of stainless steel.

Guava Varieties

The guava is a subtropical fruit, grown largely on the Indian subcontinent. Few farmers cultivate this fruit, but recently extensive cultivation has been tried with some success, particularly in the United Province. The guavas from this state are known as Allahabad variety as they are grown mainly on the belt of the Ganges.

The season starts in the middle of October and continues to the end of February, the main crop coming during the months of December and January. The size of the fruit varies from that of apricots to large pears, but, on an average, the size and shape are similar to that of a peach. The colour of the fruit, which has a smooth surface, is pale yellow when ripe, slightly greenish yellow when just ripe, and dull deep yellow when over-ripe. The colour of the flesh is white, except for a few red-fleshed varieties.



Fruit trays are dipped into the first tank containing lye solution and then into the second tank containing water. The third tank contains a dilute citric acid solution for neutralising the alkali.

Preliminary Handling

The fruits are received at the factory in baskets covered with dry leaves and paper. After weighing, the fruits are graded and washed to remove leaves and stem ends. The washed fruits are then lye peeled.

The Peeling Operation

The skin of the fruit is generally smooth, although there are some kinds with rough skins. Hand peeling, by means of a

After scrubbing clean, the fruit is cored, sliced, and has the seeds removed.

After passing through a mild brine solution, the fruit is sent to the filling tables.

pear peeling knife, was tried, but this method was found to be too laborious.

Lye peeling has, of course, been used in connexion with vegetables and some fruit, but to apply this method to guavas necessitated a considerable number of preliminary trials in order to arrive at the correct concentration of caustic soda, its temperature, and time of immersion of the fruit.

The lye peeling equipment was made in the factory and found to give a satisfactory performance even when working with delicate fruits like peaches and orange segments. The lye tank is made of stainless steel with a steam coil of the same material. The fruits are arranged in perforated basket-like trays of stainless steel covered with a perforated lid, also of stainless steel. They are immersed in the lye tanks, each accommodating two trays. This part of the process being concluded, the fruits, after a final wash, are immersed in a bath of dilute citric acid solution for the purpose of neutralising the alkali.

The concentration of the lye is about 2½ per cent. caustic soda at 195°F. The time of immersion varies from 1½ to 2½ minutes depending upon the concentration of the lye, which has to be replenished every two hours. The lye has a blackening effect on the surface of the fruit. The black surface is readily removed during the washing process on gentle rubbing by hand. The clean fruits, now white in colour, are transferred to the next tank where the stem and bud ends are removed by corer and given a final trimming.

Speed is essential at this stage to ensure that the fruits do not suffer browning owing to exposure to air.

Cans are exhausted for nine minutes in a continuous chain type exhauster.

Trimming and Filling

The peeled fruits are conveyed to the slicing table where they are quartered by means of a curved knife mounted on the table. The quarters, placed in aluminium trays, are then passed to the girl operatives who remove the seeds with a pear corer. The trimmed quarters are placed in mild brine solution and sent to the filling tables, after further grading.

The fill per A 2½ cans is 17 oz., which gives the correct drained weight after processing. Higher strength syrup does not produce good results as the fruit contains a high percentage of pectin and the syrup strength above 40° Bé. gives a gel-like appearance. For a good and balanced blend of sugar and acid, 35° Bé. syrup is found to be satisfactory and gives

The formulation of new products is carried out in the laboratory.

21° Bé. reading in the cut-out syrup.

Exhausting and Seaming

The cans are exhausted for nine minutes in a continuous chain type exhauster. On emerging from this, the contents of the cans are at 160°F. The cans are placed on the double seamer as they emerge from the exhauster, and after seaming are placed in crates for processing.

Processing is carried out in vertical retorts for twenty minutes at 212°F. Higher temperature tends to produce browning and softens the fruit. The cans are immediately cooled after processing.

Yields of Canned Fruit

The yield of the prepared fruit is only 40 per cent. as there is considerable wastage accounted for by the abstraction of seeds and in peeling, etc.

The seeds and the pulp account for nearly 35 per cent. of the total quantity; while the remaining losses are accounted for by the peel and fruits rejected by reason of softness, etc. Sixty pounds of fruit are required per case of cans of guavas in syrup of A $2\frac{1}{2}$ size.

Manufacture of Guava Jelly

Guava jelly can be easily manufactured from the seeds and the pulp, which would otherwise be wasted. The seeds and pulp are boiled in an equal amount of water for extraction of pectin. The mass is filtered and clear liquid is used for the manufacture of jelly. The guava is one of the richest sources of pectin and it gives a product comparable with apple jelly.

Flavour and Vitamin C Retention

In spite of the long series of operations and treatment of the guavas, their flavour has been found to be well preserved.

They should be a useful addition to fruit cocktail, custard, and ice cream.

The guava is rich in vitamin C, and its retention after canning is now being studied in the company's laboratory.

SUPPLIERS OF EQUIPMENT

Aluminium kettles: *The A.P.V. Co.*
Slicers and peelers: *Swift and Swallow.*
Chain blocks and strapping machinery: *W. H. Brady and Co. (Bombay).*
Platform balances: *W. and T. Avery.*
Filters: *Metafiltration Co.*
Vehicles: *Dodge; Chevrolet; Ford.*
Cans: *The Metal Box Co.*
Colours, flavours, essences: *W. J. Bush and Co.; I.C.I.*
*p*H meter: *Cambridge Instrument Co.*
Can washer: *Gladwyn and Co. (Bombay).*
Retorts and pulpers: *Food Machinery Corp. (U.S.A.).*

TO AUTHORS

FOOD MANUFACTURE is prepared to consider the publication of any books on scientific and technical subjects which authors might care to submit.

Handling Food Cargoes

THE SAVING in the time required to turn round food ships which could be made by modifying the types of containers and packages in which foodstuffs are transported are discussed by Dr. R. J. L. Allen in the *Ministry of Food Bulletin*, No. 631.

Other saving of time could be effected by increased mechanisation of the methods of loading and unloading cargoes at the docks. The available measures in these two fields are interdependent. It is apparent that fully effective measures will result only from the closest co-operation between the responsible authorities in both the United Kingdom and overseas.

Importance of Light Containers

Other things being equal, foodstuffs will be handled and transported more quickly and easily if the containers in which they are packed are light rather than heavy, compact rather than bulky, and of convenient rather than awkward shape and size. On the other hand a heavy container may be acceptable if, for example, it is exceptionally easy to handle with the equipment available. Similarly, up to a certain limit, one large unit is more easily handled than a number of smaller ones of the same total weight; this is the principle of the unit load.

Wherever possible, wooden cases should be replaced by fibreboard cases; this was extensively done during the war but wooden cases are still widely used for exported foodstuffs. With many foodstuffs a fibreboard case can give at least as good protection as a wooden case and it is both lighter and more compact. In general, fibreboard cases are 50 per cent. or more lighter than wooden cases, depending on the size.

Composite Cans and Liners

Composite cans consist of a fibreboard body with metal (usually tinplate) ends. Liners or laminations of plastic film or metal foil can be incorporated in the body to meet special requirements, *e.g.* low moisture-vapour transmission, and they can thus be used

for a wide variety of foodstuffs. They are much lighter than all tinplate cans. There has yet to be produced, however, a composite can which can be heat processed or hermetically sealed.

Other Weight Saving Methods

There are many other examples of savings in weight resulting from the use of containers made from alternative raw materials, *e.g.* fibreboard drums instead of drums and barrels made from steel or wood, and foil or plastic film containers instead of cans. An example of a light container made from a normally heavy raw material is the thin blown glass jar or bottle.

Important saving in space can be made by using containers of rectangular rather than circular cross-section, *e.g.* boxes rather than drums or barrels, and square tins rather than round tins.

The tare of a container of given capacity and construction is influenced by its relative proportions; for instance, a can with diameter 4·145 in. and height 5·277 in. has the same capacity as a can with diameter 5·662 in. and height 2·831 in., but the first can contains 9·95 per cent. less metal.

Where containers are to be carried on pallets of standard size, then the proportions of the containers should be calculated to fit.

Packages of 150-200 lb. weight generally cannot be lifted manually above the knee; 75-100 lb. packages can be lifted waist-high, and 25-35 lb. packages shoulder-high. These limits clearly need to be considered where manual handling is likely to be necessary, but are of little relevance for mechanised operations.

The American Tote Bin

Large portable aluminium containers, known as tote bins, are now in use in America for transporting commodities like sugar and flour in bulk by road and rail from the manufacturer to the user. The largest weigh 225 lb. and have a capacity of 75 cubic feet; each holds about 3,000 lb. of flour or 4,000 lb. of sugar. Some special equipment is needed to handle and

(*Concluded at foot of third column*)

empty the bins, but very considerable saving in time and labour, as compared with sacked commodities, is claimed.

Further investigation of the possibilities of such containers for ocean transport might be worth while. The problem of returning the empty bins would be a serious one; "knock-down" bins, or bins with a re-use value at the receiving end, are possible solutions.

Science and Practice of Milling

THE last 15 years have seen vast industrial changes and it is by no means surprising that the milling industry has had its fair share. It is of interest, therefore, to note the appearance of the second edition of a book* written by one who is descended from several generations of country millers who has the ability to make a scientific approach to every aspect of the subject, and furthermore is able to express himself logically, clearly, and succinctly. The author claims that his main aim is the discussion and investigation of processes, rather than a detailed description of various machines and this aim is achieved. The treatment makes interesting reading besides imparting a wealth of information not collected in any other text-book.

The book is in two parts, the first dealing with "Wheat Treatment" and the second with "Milling." Several new chapters have been added in the new edition among which are those describing wheat and wheat blending, mill exhaust, power, and insect infestation control. After discussing the latter subject the author sums up the best methods for insect control in a phrase that could be taken to heart by every foodstuff factory manager—"the essentials are those of good housekeeping—strict cleanliness in rooms, machines, and spouts."

The author considers that superfine redressing of flour and/or treatment by the Entoleter type of machine will become widely adopted. There is no doubt as to the effectiveness of the latter for killing insects, larvae, and eggs, but it is possible that the U.S. regulations concerning insect debris in imported foodstuffs may tend to place greater emphasis on superfine redressing for removing the insects, from products destined for export, and not on killing only. Unless the millers adhere to the recommendations of the makers, the machine is placed at an unfair advantage in this respect. The discussion on rodent control is good and right up-to-date.

The behaviour of moisture in wheat is dealt with in an efficient and interesting manner and the laboratory results are related in a practical way to those obtained, or the procedures followed, in the mill. The physico-chemical aspect of conditioning is well covered and the book contains a wealth of experimental results clearly illustrating the various important physico-chemical points the author is emphasising.

Throughout the book, the impression is gained that here is an author who knows what he is talking about from first-hand experience both in the laboratory and the mill. A stimulating survey of the progress achieved in the last half century and a discussion of possible future trends form the last chapter of the book. It contains numerous challenges to the engineer, who is made aware of imperfections in present practice, told what is wanted and, in many cases, offered ideas as to how the job might be done.

The author "is convinced that the only real obstacle in the way . . . is the practice of established custom and that millers leave the design of their machines too much to the professional engineers"—a conviction which is shared by the reviewer with regard to other branches of the food industry.

The book will be of wide interest to millers and cereal chemists everywhere and also to those engineering firms interested in manufacturing machines for this branch of industry. All these people will benefit by possessing a copy.—J. A. R.

* *Flour Milling Processes.* By J. H. Scott, B.Sc. Pp. xvii+670. Chapman and Hall. Price 55s.

Combating the Fat Cut

J. Stewart,
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Most bakers and confectioners are experiencing difficulty in making their reduced fat allocation do the work of the larger amount previously used. The drastic reduction in the available fat has forced many of them to decide whether to reduce quality and maintain production at the former level or to reduce production and maintain the quality as far as possible.

THE basic problem is to try and satisfy the consumers when there is available only 42 lb. in place of every 75 lb. of fat that has been previously used. There is also the additional problem of the lack of sweetened fats which many bakers have used to increase their production during the last few years.

In the interests of maintaining sales and retaining goodwill, the quality of the products must obviously be kept as high as possible.

To do this it may be necessary to abandon the production for the time being of many of those goods which require very high percentages of fat either in the batter, or as a cream filling. This may mean introducing a wider range of the plainer types of goods which will sell readily.

The average fat content of bakery products varies from about 6 per cent. in scones to about 40 per cent. in Viennese goods and the best puff pastry.

Finding a Substitute

Besides being a shortening and enriching agent, fat is also an aerating agent, since it assists in giving lightness and texture to cakes and puff pastries; it also improves the keeping qualities of the goods.

Thus, the problem is to find other materials having similar properties with which to replace it.

Fat Extenders

Various substances are now well known as fat extenders by reason of their emulsifying properties or their natural fat content, such as G.M.S. (glyceryl monostearate), soya flour, and lecithin in oil. Each of these may be used with fats to extend some of their functions.

Use of G.M.S.

The following is one way of using G.M.S.: 3 lb. of G.M.S. is melted in a clean bowl in an oven or over a low flame. One gallon of water at 140°F. is added gradually to the melted G.M.S. The ingredients are whisked during the addition of the water, and subsequently until the mixture is cool and a soft white emulsion has been produced. Twenty-four lb. of compound fat, or a mixture of 12 lb. of margarine and 12 lb. of compound fat, are beaten up in a cake machine. When the fat is sufficiently light and creamy, the prepared G.M.S. emulsion is added and slowly beaten into the fat. This will give 37 lb. of fat mixture which should be stored in a cold room to set. It is then ready for use and may take the place of the fat in the usual recipes of such articles as fermented small goods, chemically aerated goods, and cakes of good average quality. The results obtained should be satisfactory provided the balance of the original recipes is correct.

In some of the cake batters it may be advisable slightly to increase the quantity of baking powder used in order to maintain the volume and lightness of the cakes.

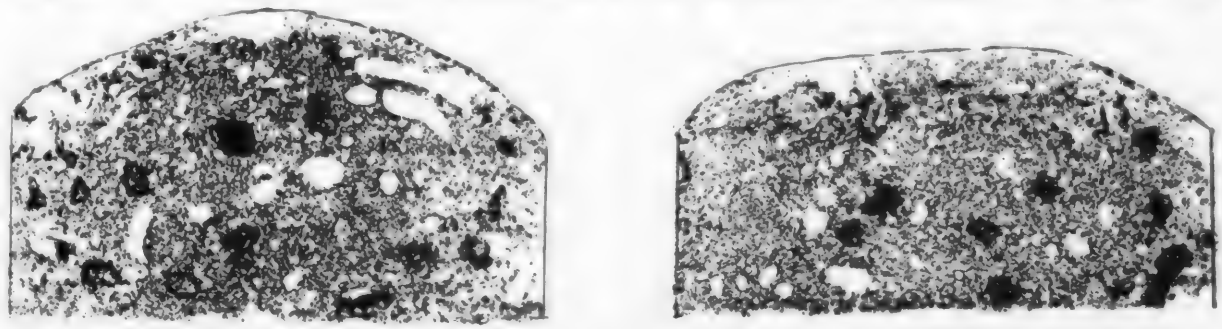
Although some bakers advocate a greater dilution than the quantities aforementioned, it is not recommended by the present author.

Cakes made from G.M.S. Emulsion

In a trial batch recently made, the following formula was used for making the cakes shown in the illustration:

	lb.
G.M.S. fat emulsion ...	4
Castor sugar	5
Eggs	4
Flour	8
Baking powder ...	¼
Milk	3½
Fruit in fruit cakes ...	4
Egg colour	*q. s.*

The cakes were made on conventional lines. The final batter was a slightly softer one than the



The fruit cake on the left incorporates G.M.S. emulsion fat and the one on the right is the control.

The Madeira cake on the left is the control and the one on the right contains G.M.S. emulsion fat.

control made with 4 lb. of margarine and fat mixture in place of the G.M.S. fat emulsion.

The cakes were nearly as good in appearance and texture as the control.

G.M.S. fat emulsion can also be used for making an excellent short paste, quite as short and crisp as that made with unadmixed fat as the shortening agent.

The formula recommended is as follows:

	lb.
Soft flour	8
Salt	$\frac{1}{8}$
Sugar	$1\frac{1}{2}$
G.M.S. fat emulsion ...	4
Milk	1
Egg colour	*q. s.*

The fat emulsion, sugar, salt, and flour are thoroughly mixed until "crumbly"; then is added the milk in which the necessary quantity of egg colour has been incorporated.

This paste blocks very well by machine and does not shrink when baked.

By using G.M.S. fat emulsion in all products there is a saving of about 33 per cent. fat.

Soya Flour

When using soya flour as a fat extender, one method tested by the author employs one part by weight of full fatted debittered soya flour and one part by weight of water at 80°F. This mixture is incorporated with four parts of creamed margarine and four parts of compound fat. The mixture is then ready to use and will replace all the fat in a well-balanced cake recipe which should not require any adjustment to obtain good results. By this means, 25 per cent. of all the available fat can be saved.

At present the materials used as fat extenders are readily available, and by their correct use, good confectionery, in quantities nearly as great as before the reduction in the fat allocation, can be produced.

Other methods of combating the fat shortage include the use of softer flours or, for short pastes, a proportion of cornflour.

With the excellent craftsmanship existing in the British baking industry, available materials will doubtless be used to produce the best possible quality goods, while maintaining production during the present shortage of fat which everybody hopes will not last too long.

Commonwealth Scientific Conference

THE Conference of the heads of the official scientific research organisation of the British Commonwealth in Melbourne has just concluded. Altogether 38 scientists were present, including representatives of the United Kingdom, Canada, Australia, New Zealand, South Africa, Ceylon, Pakistan, Southern Rhodesia, and the Colonies, as well as an observer from the U.S.A.

A wide range of matters was dealt with, including methods for the improvement of collaboration in science between countries of the British Commonwealth, the application of the results of research, the development of information services, the movement of scientists, the relations of scientific organisations with international scientific bodies, scientific representation overseas, and the provision of technical man power to assist under-developed countries.

One of the most important recommendations was that governments should seek joint action with agencies of the United Nations in order to examine the relationship between world food supplies, agricultural systems, rising populations, and the influence of medical research on improving nutrition and prolonging life. The benefits of scientific research by the increase of agricultural production are largely offset by the lower death rate and lower infant mortality resulting from the application of medical research, which is one of the most difficult problems which has to be dealt with today.

Organisation of Research

The Conference discussed at considerable length the national organisation of research. The actual form of a research organisation under the auspices of government must vary from country to country, but the Conference was able to enunciate certain general principles which have emerged as a result of past experience.

In this connexion, it was emphasised that a national research organisation cannot be successfully developed in isolation. It must have the closest association with Universities and other institutes of learning on the one hand and with

industry, agriculture, or medicine on the other. The strength of scientific effort in any country is primarily dependent on the Universities, which not only supply trained research workers, but should also be the leaders in fundamental research. In this way they maintain the scientific capital of the country.

In view of the expanding claims of national research upon trained scientists, and the need for promoting research in the basic sciences, the Conference stressed the importance of ensuring that adequate facilities are provided at Universities for training, especially at post-graduate level, and for enabling University staff and students to contribute to the advancement of science.

Of particular importance to Australia are the general recommendations about the application of the results of research in the fields of both primary and secondary industries. The Conference was particularly interested in studying the experience accumulated on this matter by the Department of Scientific and Industrial Research of the United Kingdom. It was pointed out that large improvements in efficiency could already be obtained on the basis of existing knowledge, but that no single method of ensuring the application of research was suitable in all cases.

Liaison in Industrial Research

In some countries, government research organisations undertook pilot plant development work themselves, while in Canada, the United Kingdom, and India, national corporations had been formed to secure the commercial exploitation of research results. The Conference emphasised the need for industrial research organisations to work in the closest association with all levels of industry. The raising of the technological level of industry depended to a very large extent on the existence of scientists and technologists within industry itself, from the board room table to the workshop floor.

There was no real substitute for a due proportion of such people spread throughout industry and so long as this were not realised or insufficiently appreciated, progress would be slow. Trained people of this character did not exist in any country of the Commonwealth today, and the best stimulus to improving this unsatisfactory state of affairs depended on an effective demand by industry itself.

There were special problems associated with the application of the results of agricultural research, because of the wide range of environments in which such research took place. It was stressed that there should be close association between research workers and agricultural extension officers and that to be effective, extension work should be highly decentralised. Extension officers, like research workers, should be well trained scientists and be given the opportunity of keeping themselves abreast of new scientific knowledge.

It was considered vital that the results of research should be published rapidly and in forms in which they could be readily understood by all users in industry and agriculture.

Nutrition Up to Date

By the inclusion of much new and interesting material, Professor Cruickshank's useful book* on nutrition has been brought up to date. The earlier chapters deal with what one might call "social nutrition": that is, general world nutritional problems, and in particular those of Great Britain. These are followed by conventional chapters on energy requirements, protein, fat and carbohydrate requirements, minerals, and vitamins. There follow discussions on the nutritive value of various foodstuffs, dietary planning, diet, and dental caries and then back to more general aspects of nutritional states in individuals and communities.

In the preface to the first edition, Prof. Cruickshank says that he has written the book primarily for medical practitioners and students and those members of the general public who are particularly interested in the part food plays in maintaining and promoting the welfare of the individual as well as of the nation.

He mentions the recommendations of the General Medical Council concerning the training of candidates for the diploma in Public Health and suggests that they should be given courses in the physiology and biochemistry of nutrition, and infers that his would be a suitable text-book for such a course.

Every doctor when he qualifies is accepted automatically, at least by the general public, as an authority on food and nutrition, and yet his training is woefully deficient in these subjects. A reading of this book, whether read before or after qualification, would certainly contribute appreciably towards correcting this. Medical auxiliaries might also read it with profit and so would most intelligent members of the general public.

In its new edition Prof. Cruickshank's book has everything to recommend it for the public to which he has addressed it. Another useful point about it is that each chapter has a bibliography, which means that if interest is aroused, various aspects of the subject can be followed up in greater detail. The book is rounded off by a good index.—G. H. B.

* *Food and Nutrition.* By E. W. H. Cruickshank, M.D.(Aberd.), D.Sc.(Lond.), Ph. D.(Cantab.), M.R.C.P. Pp. 443+xi. 2nd Edition. E. and S. Livingstone. Price 30s.

New Books Register

Orders for any of the books listed below, or scientific and technical books in any language, may be placed with the Books Department, FOOD MANUFACTURE, *17, Stratford Place, London, W.1. A selected stock of books is carried and may be inspected at the above address. Prices given do not include postage.*

Smith, Henry. *Essential Food Facts for Successful Catering.* Practical Press. Pp. 104. 6s. 6d.

Emerick, R. H. *Heating Design and Practice.* McGraw-Hill. Pp. 453. Illustrated. 68s.

The U.S. Canning Industry from 1940 to 1950

Part I

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The last decade has been marked by the introduction into commercial use of an unusually interesting and significant group of technological and engineering innovations. Some of these represent completion of research and development programmes that have been in progress ever since the time of the first activity in the canning industry that was worthy of the description of technological experimentation.

NO ONE who is versed in canning lore is surprised to be told that practically all technological advances in the canning industry are associated with efforts to produce preserved food having better quality than that which has been produced by conventional canning methods. The period since the outbreak of World War II has been an especially fruitful period in the introduction into commercial use of new processes which accomplish this purpose.

In describing these processes, there will be included all those which appear to be ready for commercial application even though they may not yet have been used on a commercial scale. For classification, to assist in making a logical presentation, the processes may be divided into three categories or types, described briefly as follows:

1. High temperature short time sterilising processes.
2. Sterilising processes employing temperature and time in the intermediate range and employing a modified technique during processing.
3. Preservation processes employing modified technique in the preparation of a food product for processing, followed by use of conventional procedure in processing.

In addition to processes of the above three types, which already are in commercial use, a few preservation processes will be briefly described which, to the best of the author's knowledge, have not yet reached the stage of commercial readiness

The HCF Process

The HCF process was named by putting together the initial letters of the three words, "heat-cool-fill," which describe the procedure followed in the process. Ball[1] describes this process by stating that it "provides for the operations of sterilising empty containers, sterilising and cooling covers for the containers, sterilising a food material in bulk, putting the sterilised food into the sterilised containers, and applying the sterilised covers to seal the containers. All operations in handling the sterilised objects until after the containers are sealed are performed under aseptic conditions, which are maintained in closed containers by the presence of steam under a pressure greater than that of the outside atmosphere."

In practice, sterilisation has been accomplished entirely by heat through indirect use of saturated steam in a heat exchanger through which the product flows continuously; thereafter, the product is cooled while flowing through a similar heat exchanger in which water is the cooling medium. If the cooling prior to filling is not all that is required for the final product, a final stage of cooling is carried out on the sealed containers.

Production of Aseptic Conditions

The aseptic conditions in which the containers are filled and sealed are created by maintaining a positive pressure of about 2 to 3 lb. per sq. in. either by means of saturated steam alone or a mixture of saturated steam and sterile gas, which fills a chamber in which the filling and sealing are carried out.

Containers and covers, previously sterilised with saturated steam, are introduced into the chamber through rotary pocket valves, all surfaces of which are kept continuously sterile by protecting them from contact with outside atmosphere. The walls of the filling-sealing enclosure have substantial strength to make possible the sterilisation of the interior of the enclosure with steam under pressure of 20 lb. per sq. in., or more, prior to operation of the equipment.

Objectives of HCF Process

The object in using this process is to effect the great improvement in quality of canned product which is possible with very short sterilising processes. About 10 years ago the HCF process, sponsored by the American Can Company, went into commercial use in processing a chocolate flavoured milk beverage, and the process has been used continuously on that product. The sterilising process is at a temperature of 280° to 290°F. (138° to 143·5°C.) for a period of about one minute. A most desirable quality is obtained in a product which is rendered unacceptable when sterilised in the conventional manner. The process is carried out under the protection of U.S. Patent 2,029,303.[2]

A special treatment of the cocoa raw material was found to be necessary in order to render the cocoa free from viable spores of micro-organisms which proliferate in various constituents of cocoa before the product is formulated. This treatment is covered by U.S. Patent 2,396,265.[3] A description of the equipment used in processing the chocolate flavoured drink is contained in an article entitled "Sterilisation by

From a paper delivered at the Second International Congress on Canned Foods, Paris, October, 1951.

Heat" by Jackson and Benjamin.[4]

In 1949, additional equipment was installed to double the producing capacity of this operation. Inasmuch as this operation has been commercially successful, curiosity is naturally aroused in the minds of those who are interested in this sort of process as to why the use of the HCF process has not expanded to include other products. With experimental equipment, during the development of this processing procedure, demonstrations were made of vastly superior quality in dairy products, vegetable purées, cream style corn, and other products when sterilised and canned by the HCF process as compared with the quality of these same products canned and sterilised by conventional methods.

A commercial operation, which continued for only a few months, was carried out in 1948 on strained vegetables, which were packed in cans of about one-pound capacity. This operation was successful mechanically except that the heat exchanger used for sterilising the product was reported not to have given entirely satisfactory results and it was said that this difficulty, combined with a further problem encountered in attempting to establish a market for vegetable purées in a field other than that of baby foods, caused suspension of the operation. However, it seems to be generally believed that the requirement of highly specialised equipment for filling and sealing the containers, which is quite costly, is the main factor that has retarded expansion in the use of the HCF process.

The Avoset Process

The Avoset process went into use on a physically stabilised cream product, called "Avoset," in about 1942. This resembles the HCF process in principle but in operation it differs in that there is no positive control of atmospheric conditions surrounding the filling and closing operations. These operations are carried out in an air-conditioned room at atmospheric pressure, the atmosphere of which has direct contact with the outside atmosphere at an opening in the wall of the room through which the containers, after sealing, are discharged by conveyor into the outside atmosphere. Moving parts of the conveyor may carry some bacteria into the filling and sealing room but an outward flow of air through this opening is maintained, which protects against entrance of air from outside the room.

The Sterilising System

Sterilisation of the product is conducted in heating and cooling tanks which are part of a sterilising system originated by George Grindrod. In this system, the food is heated by saturated steam in high velocity jets which are directed into the product. The steam injectors usually operate at pressure between 35 and 55 lb. per sq. in. within vertical cylindrical chambers, through which the product is forced continuously by pumps. After the product attains its maximum sterilising temperature (usually between 260°F. (127°C.) and 280°F. (138°C.)), it is held without cooling for a sufficient length of time to complete the sterilisation of the product.

When sterilisation is completed, the product is forced by pressure into an evaporator where it is condensed to the desired proportions and cooled to the proper temperature for homogenisation. After being homogenised, the product is filtered, and cooling is then completed in a heat exchange type of cooler, from which it is pumped into holding tanks, vents of which are protected by ultra violet lamps.

From the holding tank, the product flows by gravity to the filler, the atmosphere around which is air that has been treated to remove bacteria and which is further protected by means of ultra violet lamps. The Grindrod sterilisation system is described in a number of U.S. Patents.[5-15]

Modifications of the Avoset Process

In the Avoset operation, for a number of years containers were sterilised by means of saturated steam in retorts, mounted so as to extend through the wall of the filling and closing room. Each end of the retort was fitted with a door. The retort was loaded from the outside and the sterilised containers were discharged inside the room by opening the inside end of the retort.

This method of sterilising containers was discarded in favour of presently used hot air sterilisation of continuously moving containers which are discharged from the continuous steriliser into the filling and closing room. Since glass containers are used, it is unnecessary to limit the maximum temperature of the sterilising air to a temperature below that at which solder on cans would be softened.

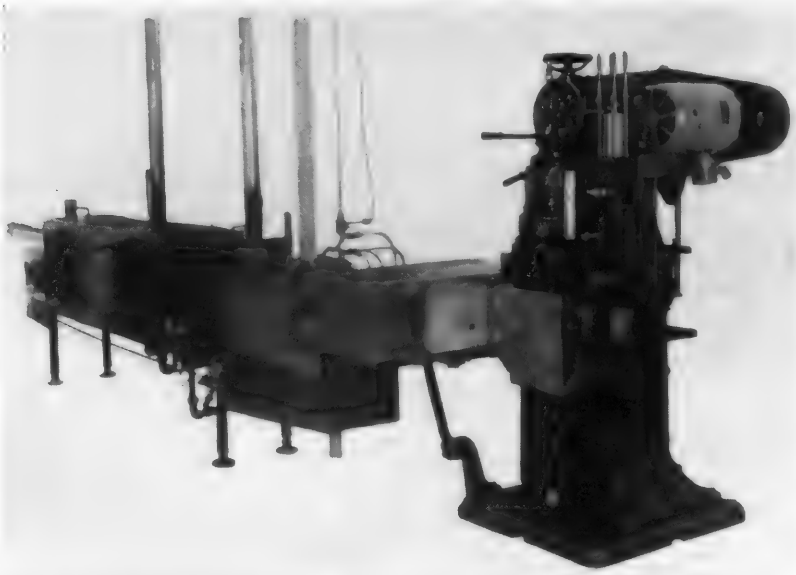
Closures for the containers are sterilised in retorts in a manner like that described above for the containers. Operation is carried on at a rate of from 75 to 100 eight-ounce bottles per minute. This operation has been successful in producing commercially a cream product of outstanding organoleptic quality and has led to the establishment of a second plant. In this plant, however, a different processing system has been installed, known as the Martin process.

The Martin Process

The development of the Martin process was begun during World War II, the first commercial installation, involving a unit with a production capacity of 60 eleven ounce cans per minute, being put into operation in 1950.

The product is sterilised and cooled in the same manner as in the HCF process; it is in the sterilisation of containers and in filling and sealing, that the Martin process differs from the HCF process, the former employing superheated steam at atmospheric pressure instead of saturated steam under higher pressure. Martin[16] describes the fundamental steps of his process in these words:

"The canning procedure consists of four separate operations which are carried out simultaneously in a closed inter-connected system as a continuous process. The operations are: (1) sterilisation of the product under pressure at a high temperature by quickly heating, holding, and cooling it



Martin aseptic canning unit showing overall front view with Canco closing machine.

in a continuous flow-type pressure cooker; (2) sterilisation of the containers and covers with superheated steam or other hot gas; (3) filling of the cold sterile product into the sterile containers; and (4) aseptic sealing of the containers with sterile covers.

"The various operations are synchronised mechanically so that the raw product, containers, covers, and finished canned product move through the system without interruption. The product is maintained under pressure throughout the sterilisation process, and the filling and sealing operations are carried out in an atmosphere of superheated steam or other sterile inert gas."

In accordance with customary procedure with all processes of this general type, before the process is used all surfaces of equipment, from which bacterial contamination might enter the food, are sterilised. The interior of the product heater is sterilised with either water or saturated steam at a temperature which is usually above 260°F. (127°C.) and the aseptic canning equipment, as well as the sterilisers for containers and container closures, are simultaneously sterilised with superheated steam or other gas at 400° to 600°F. (204·5° to 315·5°C.).

The Martin process has been designed for use with liquid products only. The product heater is of the tubular type and the filler, as described by Martin, "consists of a rectangular enclosure through which the cans are conveyed continuously in a straight line beneath a slit-type filling nozzle." Martin reports that "spillage is almost completely eliminated by the overlapping flanges of the cans as they pass beneath the filler slit."

Information available on the time and temperature conditions necessary for sterilising empty containers by means of saturated steam was extensive even before the Martin process was developed. This information, however, could not be applied to sterilisation by means of superheated steam; therefore, to ascertain the combination of time and temperature necessary when superheated steam is used, Martin conducted extensive experimental packing tests, in which cans and covers were inoculated with spore suspensions of Organism PA-3679 and Flat Sour Organism 1518, supplied by the National Canners Association. He published data resulting from these tests,[16] also a list of combinations of time and temperature which were found to be effective.[17]

With the use of pilot equipment, the Martin process has been shown to be capable of producing sterilised food of 32 different varieties, having much better flavour and colour than control samples processed by conventional methods.

The Smith-Ball Process

Designed to operate under 20 lb. per sq. in., the plant used in the Smith-Ball process offers many possible advantages in the canning of foods. At this pressure, water boils (or steam condenses) at 259°F. Thus foods may be pasteurised and equipment sterilised much more rapidly using room-pressure steam or hot water immersion within the room.

Savings may be effected in reduced heating requirements (owing to the much shorter contact times), the elimination of heavy pressure vessels, and much faster processing rates. The cooling of the product is also said to be improved.

Workers operating this plant will have to pass through special conditioning chambers to prepare themselves for work in the pressurised plant, but it is estimated that they will spend less than 20 minutes per eight-hour working day in compression and decompression chambers.

Pre-sterilising Tomato Juice

Studies of *Bacillus thermoacidurans*, the usual causative microorganism of flat sour spoilage in tomato juice, during the 1930's led to the development of a pre-sterilising technique through which the sterilisation of tomato juice could be assured when the bacterial contamination of the raw material is within reasonable limits. A short heat treatment at a temperature in the vicinity of 250° to 270°F. (121° to 132°C.) is given the juice prior to filling into containers. This heat treatment is designed to destroy heat-resistant acid-tolerant bacterial spores in the juice before packing. The treatment is applied while the juice is in continuous flow through a heat exchange apparatus of either plate or coil or straight tubular design.

The heating of the juice is as rapid as possible, but the rate of heating varies with the design of the heat exchanger. Thus, in

selecting the design of the heat exchanger, several factors must be considered, *viz.* (1) the distance the heat must flow through the product, (2) the conveyance of heat by currents within the food, produced by turbulence, (3) turbulence which may affect surface film formation.

These factors determine the rate at which the tomato juice will be heated; thus, to a large extent, they hold the answer to the question as to the overall advantages, from both quality and cost standpoints, of the pre-sterilisation procedure over other procedures involving sterilisation in sealed containers such as that of end-over-end rotation of the containers. This question deserves consideration by anyone planning to equip for sterilising tomato juice.

Contamination Eliminated

An important advantage in sterilising the juice in sealed containers is that this procedure obviates the possibility of contamination of the juice with resistant spoilage micro-organisms during the filling operation. Should such contamination take place when the pre-sterilisation procedure is being followed, the canned juice will spoil because, under this procedure, the juice undergoes only a mild heat treatment after the container is sealed.

Factor No. 1 mentioned above is obtained in the pre-sterilisation process by making the channel through which the juice flows between heated surfaces very thin and is obtained in the process of sterilising in the sealed container by using containers of small size.

Factor No. 2, *viz.* turbulence, is obtained in the pre-sterilisation process by making variations in the cross-sectional shape of the channel through which the juice flows during heating and by employing a high velocity of flow of the juice through the channel during heating, and can be obtained in the process of sterilising in the sealed container by using an optimum speed of rotation of the containers during heating and by using the maximum permissible headspace in the container.

Factor No. 3, *viz.* reduction of surface film effect, is applicable only to the pre-sterilisation method. Advantage can be taken of it only by employing an extremely high velocity of flow of the juice through the channel during heating. Although the practical significance of the benefit obtainable through this factor may be questioned, it is said that a tubular coil passing 1,800 gallons of liquid per hour at a velocity of approximately 2,000 feet per minute has an overall heat transfer rate of 1,200 B.Th.U. per hour per square foot per degree F. mean temperature difference, which is twice as great as that claimed for any other heat exchanger.

It is further claimed that, under this high turbulence, the temperature of juice can be raised from 100° to 300°F. (38° to 149°C.) in two seconds.

Sognefest and Jackson[18] describe the pre-sterilisation procedure as follows:

"The commercial application of the pre-sterilisation method consists of heating the prepared juice rapidly and continuously to a temperature of 250°F. to 280° F. (121° to 138°C.) depending somewhat upon the type of heat exchanger employed, and rapidly cooling to a temperature below the boiling point before filling. The juice is filled at a minimum temperature of 190°F. (88°C.) and held for three minutes before water cooling. The 'high-short' process is designed to destroy spores of heat-resistant, soil-borne micro-organisms and the high filling temperature and the short hold before water cooling serves to kill bacteria of low resistance that re-enter the product during filling. . . .

"Care is exercised in sterilising the entire equipment contacting the juice with water at around 240°F. (115·5°C.) for 10 minutes before admitting the sterile juice. . . .

"If a 250°F. (121°C.) process is used, a holding time of 0·7 minute at 250°F. has been suggested for sterilisation with respect to *B. thermoacidurans*. This holding time is effected by connecting a pipe of sufficient capacity in the juice line between the heater and cooler. At 265° to 280°F. (129·5° to 138°C.) the entire process may be accomplished by bringing the temperature of the juice up to these temperatures. The temperature needed depends largely upon the particular rate at which the juice is heated and the particular type of equipment used."

Certain historical facts bearing on the development of the pre-sterilisation procedure for tomato juice are quoted from Sognefest and Jackson.

"From many unpublished results on thermal death time tests employing the multiple tube technique, practically all strains were destroyed at a sterilising value corresponding to 0·7 minute at 250°F. (121°C.). The choice of a sterilising value equivalent to $F_0 = 0{\cdot}7$ seemed to be a reasonable one for the commercial application of the method since the maximum resistance seemed to be around this value. An equivalent boiling water process for a No. 2 can of juice with an initial juice temperature of 170°F. (77°C.) would be about 140 minutes at 212°F. (100°C.). Such a long cook would, of course, cause much quality deterioration, but it clearly indicates the exceptionally high heat resistance of this spoilage organism.

"Since no loss in quality was found in the juice packed by the 'flash' sterilisation procedure, which later was termed the pre-sterilisation method, commercial installations employing this method were placed in use during the 1941 canning season."

The rapid growth in acceptance of the method in the United States is shown by the fact that, during the 1945 season, approximately 50 pre-sterilisation units were in operation and the number has increased each year since 1945.

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(*Continued on page 187*)

Mechanical Handling of Food

It is barely thirty-five years since the first power truck was seen in a British factory. Mechanical handling, which today is a real force throughout the food industry, starts at the dockside, where the materials of food are first unloaded. The process saves labour, costs, and fatigue throughout the many complex operations which must take place before the goods are ready to leave the factory for delivery, by road or rail, to the warehouse of the distributor.

SINCE the first power truck made its appearance four main designs have come into common use: the tractor trailer, the fixed platform truck, the elevating platform truck, and the high lift fork or tiering truck.

The tractor trailer is a haulage rather than a handling vehicle. The loaded trailers it pulls are limited only by the ability of the tractor to pull them. Loading must be done by hand, crane, or self-loading truck.

The fixed platform truck is also a simple haulage vehicle requiring some external means of loading and unloading. The elevating platform truck was designed to banish the strain of dragging heavy loads over short runs and in congested areas. The operator directs the truck, usually from a seat at the rear. The platform, designed to slip under a loaded stillage, is raised a few inches by motor or hydraulic pressure. The truck then moves off either in forward or reverse gear.

A popular elevating platform truck is that which is "led" by the operator, forward and reverse controls being set in the steering handle and arranged for easy thumb-tip operation.

The high-lift fork is fitted with "fingers" which can lift, move around with and stack to ceiling height, previously loaded pallets comprising wooden or steel trays of two layers separated by bearers to provide a space between the layers for entry of the fork fingers.

The hand truck, which has served industry so well in the past, is almost a back number now. Output has risen to a point where the loads that must be carried have become too heavy for any workman to pull.

Loads of as much as a ton-and-a-half piled on stillages used to be raised on to bogies and dragged over long hauls by hand, such back-breaking work imposing undue strain on the workman.

Apart from this aspect there was the risk of accidents, many of which could be ascribed to careless stacking resulting in the slipping forward of a heavy load on to the man pulling it, or sideways on to some passer-by.

The Matling 9 ft. stacker in action in a 4 ft. gangway.

Elimination of Accidents

Accidents with power trucks of all types are rare, mainly because the loading of the stillages is not usually the operator's responsibility. For instance, with an elevating platform truck the operator's job is to insert the elevating platform under the previously loaded stillage, raise it by a high pressure hydraulic pump operated by a foot pedal, pick up the load, and walk away with it. In the same manner the fully loaded platform is set down at will, and without shock.

Even when the operator loads the stillage himself, he is not tired to start with, which psychologically has a big influence on the care he puts into his work.

A study of mechanical handling at work at the docks, on the riverside, and in factories shows how the moving of raw materials and the finished goods is being dealt with in the food industry today.

In the Docks

The Port of London Authority —the largest dock system in the world—uses 2 ton battery-powered electric platform trucks, some of

which have been operating since 1921.

In a normal year the P.L.A. imports, exports, and transhipments 40 million tons of merchandise, much of it food.

The chief virtue of the electric trucks in the docks lies in the speed with which it covers long runs between the quay-side and the warehouse.

In one instance, the run from the ship to the warehouse was approximately a quarter of a mile along a cobbled quayside. Each electric truck carried nine sacks of sugar (30 cwt.) and delivered it to the warehouse crane in ten minutes. Hand-trucking the same load with stack barrows, at the rate of one sack per barrow, would have taken nine men 90 minutes.

An 8,000 ton cargo of sugar can be unloaded by 21 electric trucks in five days. This time saving element also results in a quicker turn-round for the cargo ships.

A Ransome fork lift electric stacking truck in the H.P. factory.

At the Riverside

The same result of saved time and money is to be seen on Thames-side where barges come upstream from the docks and moor off wharves clustered between Westminster Bridge and Tower Bridge.

The waterside labourer, who was used to hand-trucking everything that came his way, welcomed the introduction of battery-powered electric trucks, which took much of the drag and strain out of his daily work.

At many wharves where food is handled, 2-ton fixed platform trucks, or "scooters," handle the work.

At the back of many of these wharves are long sheds, some three or four hundred yards in length, in which are stored the thousands of tons of food, which has either been landed from the river or is due to be loaded into barges for transport elsewhere.

The trucks operate wherever they are needed in these vast open buildings. Sacks, piled on the platforms, are handled by trucks and cranes.

The platform truck is favoured because of the varied types of cargo handled. River Plate maize, glucose, raw sugar, wheat, palm kernels, and copra come in sacks. Neither the elevating platform nor the tiering type of truck is suitable for lifting the sacks, many of which burst open in transit and need special care in handling.

At one time, with hand-trucking, 80 to 100 tons was considered to be a good day's "lift" at the wharfside. Now the daily average is 150 to 200 tons.

It is estimated that one electric truck driver replaces three men working hand-trucks. As wharf labourers, including the truck drivers, are paid according to the amount they load in a day—irrespective of time—and as the average daily earnings per man works out at around £1 15s., a real saving in effort and wages is effected.

Platform trucks are also used for handling meat, canned fruit juices, frozen eggs, butter, bacon, fruit in open trays, vegetables, and poultry, which are held in cold storage for from six to eight weeks before being distributed to the wholesalers.

Two tons of dates are unloaded from a battery electric platform truck at the West India Docks.

Wooden pallets, each holding 24 cartons, are stacked by means of a fork lift truck. *Photo Barron and Shepherd.*

Palletising Cuts Handling Charges

Palletising is the operation of handling and storing products in unit loads, *i.e.* as goods come off the production lines, they are stacked by hand on to pallets. These are picked up by a fork lift truck and taken direct to the store for stacking, one above the other.

In food and other factories, the advantage of this method of handling is that space to ceiling level, which hitherto has been lost, can now be used. There is no question of unloading. The unit loads are left in position until needed, the fork lift truck taking them down as easily as it puts them up, for conveyance to the despatch department.

Another obvious advantage is that only one handling is necessary. Once the goods are off the production lines, they need not be broken up and disturbed until they are required.

The railways have taken things a step further and now take complete pallets into their containers and trucks so that these need not be unloaded until they reach their destination.

With hand stacking it is considered impractical to stack much above six feet high. This is generally done by a chain of workers, but the cost of the higher piles is usually out of proportion to the advantages when hand stacking is used. With the fork truck and pallet system, it is practical to stack most commodities to a minimum height of 12 feet. Where the new "barrel" ceiling has been installed 17 feet is possible.

Pallets in a Food Factory

Most large food factories, which have to store their products for any length of time, now use palletising to solve storage difficulties.

The handling of dead weight is not the only problem which the power truck has solved. The collection and transport of vast numbers of small manufactured goods —light individually, but heavy in the mass—have called for special ingenuity on the part of the designer.

At Cadby Hall, fork lift trucks are being used increasingly to handle the output of cakes, pies, and bread which flows from the seven bakeries. In a week something like 2,750,000 separate packets are handled, comprising swiss rolls, individual fruit pies, packets of sponge cake, madeira cakes, 4 lb. slab cakes, and buns.

Mechanical handling inside the Lyons organisation has developed rapidly in the past two years. Now it is rare for any raw materials or finished goods to be moved by hand. Three fork lift trucks are used to load and unload at the great modern warehouse at Greenford.

Manufacturers delivering to the warehouse are using pallets supplied by Lyons, in increasing numbers, so that their goods arrive ready to stack after removal from lorries or railway containers by fork lift trucks without any laborious unpacking and repacking. The materials, still on pallets, are then transported to Cadby Hall, where they are again handled by fork lift trucks to the

A low loader Brush battery electric industrial truck with 11 in. loading height elevating through 5 in. for stillage work.

point of manufacture. In this way 90 per cent. of all raw materials needed are handled mechanically cutting down enormously on labour costs.

Where raw materials are coming from abroad to be delivered to the company's Greenford warehouse by canal, fork lift trucks, using slings, lift the loaded pallets and take them into the warehouse.

Introduction of the Box Pallet

Ordinarily flat pallets are not suitable for certain articles such as tins of jam, cartons of margarine, and dried fruit which pack unevenly. To meet this need a box pallet has been devised which incorporates several trays. The articles carried are so contained that they cannot spill or tip over.

Some box pallets do round trips, coming from the jam factory at Fulham to Cadby Hall and back to Fulham for another load. In the same way box pallets are loaded at the firm's box-making factory at Covent Garden, sent to the packing materials' warehouse at Wandsworth or direct to Cadby Hall, later being returned to Covent Garden for another load. This excludes all handling of packing materials, which are taken, at Cadby Hall, direct to the operators responsible for packing goods in the bakeries.

Fork Lifts and Ice Cream

Fork lift trucks are also used for the transportation of ice cream transit chests. These are taken by lorry, on extra large pallets, to Addison Road station where a truck with special long forks lifts the pallets, each containing twenty chests, from the lorry, and enables the station staff to sort them into the right trucks ready for despatch as the train is made up. The pallets are then returned to Cadby Hall.

Liquids and semi-liquids are conveyed by lorries with special elevated tail-boards. The goods are wheeled on to the tail-board when it is in its lowest position. A pneumatic pump raises it to its normal height and the lorry is then driven away.

Eleven fork lift trucks are used at the company's warehouses and factories. Inside Cadby Hall, for internal use only, there are a number of elevated platform trucks which perform many useful duties, one of which is to carry 145,944 trays on stillages to the washing plant each week.

Palletising is not a cheap method of handling. A well-made wooden pallet of ample dimensions can cost as much as £3 and rarely less than 35s. As several thousand are needed by a business of any size, £10,000 can easily be added for this one item to the initial cost of the truck and the installation of a recharging system, if the truck uses batteries.

When everything is taken into account, and the costs are set against the savings in wages and man-power and above all storage space and time, the benefits are soon appreciated, and a return of capital outlay not long delayed.

Experimental Abattoir

THE Government slaughterhouse at Guildford is one of two experimental and demonstration slaughtering centres which will be operated by the Ministry of Food. It has been planned to serve a medium sized town with a surrounding rural district, and the slaughtering capacity will be sufficient to supply the requirements of a population of about 200,000. The other Government experimental slaughterhouse, now being built by the Ministry of Works at Fareham (near Portsmouth and Southampton), has been designed for the needs of a large urban area with a population of over 500,000.

Many important industrial and agricultural activities have for years past had their particular Government-sponsored research, experimental, and demonstration centres; but up to now the slaughtering industry has been at a disadvantage in not having an experimental station where research directed to effecting improvements of equipment, slaughtering techniques, and standards of hygiene could be carried out and where problems of providing adequate facilities for meat inspection could be examined.

As a demonstration centre, the new slaughterhouse will be available for inspection by representatives of local authorities and organisations connected with the slaughtering industry throughout the country. The day-to-day working may point to further improvements which might be incorporated, and these will be noted for the information of those concerned with the building of future slaughterhouses. The Ministry's technical officers responsible for slaughtering arrangements will be in constant touch with the routine operations.

Apart from its use as an experimental centre, the slaughterhouse will provide some additional slaughtering capacity, which is urgently needed to deal with the increased numbers of fatstock that are being produced as a result of the programme of agricultural expansion.

No provision has been made to process by-products. The aim has been to arrange that they will be handled in such a way that they can be sent to processing plants without deterioration.

On the engineering side, normal industrial equipment has been used throughout, except for the introduction of two experimental items: the underground steel storage tank for blood has been specially coated to resist the corrosive action of the blood, and a carcass-splitting saw takes the place of manual cleaving.

The U.S. Canning Industry

(*Continued from page* 183)

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Quick Frozen Fruits and Vegetables

W. V. Smedley and E. E. Pratt

Although the freezing of fish and perhaps some trapped warm-blooded animals probably took place some hundreds of years ago by the people of such countries as Iceland and Newfoundland, it was not until 1865 that the artificial freezing of fish was introduced commercially in the U.S.A. Any freezing done before then was termed "weather freezing," and was a comparatively slow process.

BETWEEN 1865 and 1880 fish were frozen artificially by placing them in covered pans surrounded by ice and salt. In about 1880 ammonia refrigeration machines began to be employed for the freezing of fish in America, and by the end of the century this industry had become quite important, some 3,500 tons of fish being frozen a year in this way.

It was in the early 1890's that artificial freezing was also taking place in other parts of the world, ammonia being used as the refrigerant. New Zealand, for example, was shipping to the U.K. in 1891 some two million carcasses of frozen mutton. There are reports that beef, mutton, and other meat products were being frozen in Europe. Shelled eggs were first frozen successfully in 1889.

The freezing of fruits and vegetables was not attempted until 1905, and took the form of freezing some of the smaller fruits for later use in jam. Little interest was shown at first, and this side of the industry grew very slowly, but by 1922 expansion became more rapid, the pack for 1926 in the U.S.A. having grown to about 18,300 tons.

The freezing of vegetables is even more recent, production being commenced by Clarence Birdseye in 1929.

One of the pioneers in this country was Smedley's, who successfully started production of quick frozen fruits and vegetables in 1935. At first, progress was slow; there was an enormous sales resistance to be overcome, but apart from a few lean war years there has been continuous expansion.

Abstract of a paper delivered before the Institute of Refrigeration at The Institution of Mechanical Engineers.

What is Quick Freezing?

Several standards have been suggested for a minimum rate of freezing which could be termed "quick freezing," but it was finally decided that that of Pennington, put forward in 1941, was the best working standard.

Appreciating that the zone where maximum crystallisation took place was that between 32° F. and 25°F., it was agreed that the term quick freezing should apply where this zone could be passed through in 30 minutes or less.

This maximum crystallisation zone is important because by slow freezing the ice crystals formed within the fruit or vegetable would be large enough to damage or rupture the cell walls. A strawberry, for instance, is composed of delicate cells and about 85 per cent. water., and if large ice crystals were allowed to build up, serious damage would occur to the cell structure.

Quick freezing has several advantages. Less time is available for the diffusion of salts and the separation of water as ice, and the produce is cooled rapidly below the temperature at which bacterial, mould, and yeast growth occur, thus preventing decomposition during freezing.

When a slowly frozen article is thawed out, the natural juices tend to drain out, leaving a flabby product which lacks both colour and flavour. This can be overcome by quick freezing.

A number of quick freezing methods are in use today:

1. Freezing in a blast of air (the blast tunnel system).
2. Freezing by indirect contact with a refrigerant (the plate system).
3. Freezing by direct immersion in a refrigerating medium (numerous systems: spray; direct simple immersions, etc.).

Peas in pod are loaded on to the viner.

The Plate System

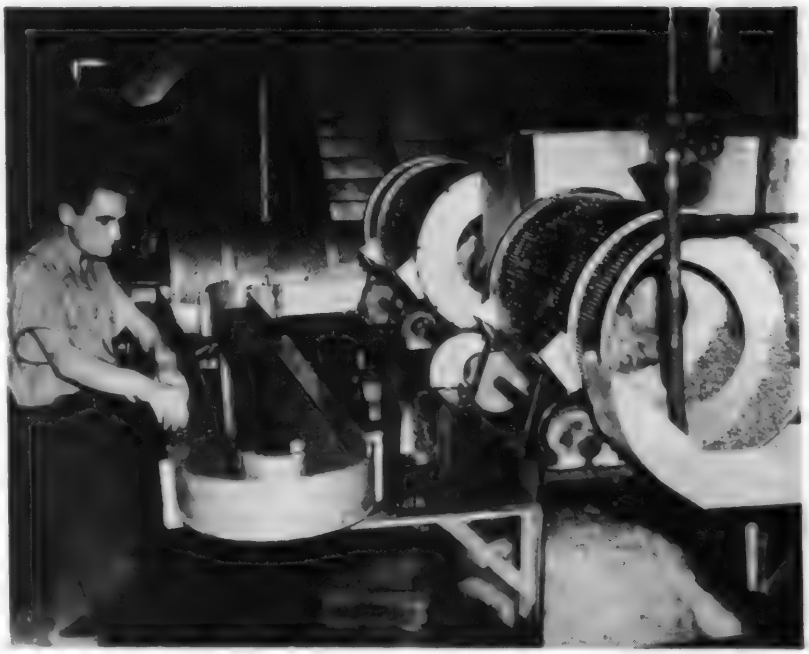
There are a number of variations of the plate system, but basically the principle is the same throughout. The equipment consists of separate, complete units in cabinet form of which the average size is about 3 ft. 6 in. square by

5 ft. tall. The cabinet is insulated and the freezing compartment is reached by swing door at the front. Inside are six to ten horizontal hollow metal plates spaced about 4 in. apart through which the refrigerant, usually brine or ammonia, is circulated. In many cases these plates can be raised hydraulically so that the tops of the articles being frozen will come into contact with the bottoms of the plates above them, thus increasing the efficiency of the plant.

Pros and Cons of the Plate System

The main advantage of this plant is that the separate units can be moved to any required position, providing power is available; in addition, the floor space taken up is not large.

The disadvantages are that the plant only lends itself to the freezing of uniform packets and cannot operate with maximum efficiency with larger irregular objects, such as poultry. Also, when loading and unloading, considerable heat enters which means that unwanted time and power is expended in bringing the temperature down again. Once loaded and switched on the plant operates automatically and takes about two hours to freeze fruits and vegetables packed in 2 in. thick packets.



Quality grading is carried out by brine flotation.

One Variation of the Plate System

A variation of this method consists of an insulated cabinet containing 24 pairs of plates mounted substantially parallel on a large rotating drum and radiating outwards. Refrigerant is circulated through the plates from a distributor chamber in the drum. As the drum rotates a pair of plates arrive at a loading slot where a tray of packets to be frozen is placed between the plates. As the loading slot door is shut, the drum rotates and the next pair of plates comes in line for loading.

This operation is repeated until all plates are filled, by which time the first packets loaded should be frozen. These can be withdrawn and the whole cycle of operations repeated.

One claimed feature of this system is that there is never any so-called peak load on the compressor unit as is the case where the cabinet is loaded to capacity in one filling.

The loading end of a quick freezing tunnel.

Continuous Quick Freezing Device

Another variation of the plate system is that produced for the continuous quick freezing of loose fruits and vegetables. The plant consists of an insulated cabinet containing 15 equally spaced, horizontal refrigerated plates. These plates are so fixed that the even number ones project a few inches to the right. A system of pulleys is so arranged at the ends of these plates and an endless belt placed on them to which are attached at intervals some scraper arms so that when the belt is in motion both the tops and bottoms of the plates are being continually scraped clean.

Following a given scraper from the start it will clean the first or

In the assembly section, the products are packed into cases.

top plate from right to left, go round the pulley, and then clean number 2 plate from left to right, and so on. The food to be frozen is fed on to the top plate on the right-hand side in controlled amounts. This food is then moved over the plate by the scraper, further food replacing that moved until the next scraper comes along.

The food is moved along to the opposite end of the plate where it drops down on to the second plate, and so on until it reaches the outlet chute at the end of the bottom plate.

Freezing is very rapid and automatic, and the capacity of the plant is large in relation to its size. The object of scraping the bottom of the plates is obvious in that the small accumulations of frost are being continuously kept clear, eliminating any necessity for de-frosting.

A British Unit Type

A leading firm of British refrigerating machinery manufacturers have produced a unit type of plate freezer that has the added advantage of incorporating air blast, which is achieved by a fan circulating air over a gilled cooler and delivering over the fixed plates by means of adjustable slots in a vertical air trunk.

The high velocity of the air ensures rapid removal of heat from the exposed surfaces of the product, and adjustment of the slots provides each shelf with an equal circulation of air. If desired, air circulation can be concentrated on any particular shelf.

Passing from the consideration of the conventional plate shelf, there is another type of freezer which is installed in at least one of the sea-going trawler fishing factories. This plant, which could equally well be used for freezing fruits and vegetables, consists of shelves made up of a single layer of horizontal parallel tubes through which a brine refrigerant is circulated. The fish are packed in containers and frozen by conduction by placing the containers on the tubed shelves in the normal way.

Although there is an air space between the upper surface of the fish containers and the underside of the next brine plate, cooling from the upper side of the containers is claimed to be 40 per cent. of the whole. This is achieved by the provision of extended fins on the brine pipes and on the lid of each container. As in the case of the last-mentioned freezer, an air blast is incorporated at a velocity of 24 ft. per second.

Direct Immersion Plants

The pan method was used as early as 1869 and is still used to some extent, generally for the freezing of fish. It consists of a metal pan fitted with tight fitting lids in which fish are packed closely. The whole pan is then completely immersed in alternate layers of salt and ice, the eutectic mixture used being 23 per cent. salt and 77 per cent. ice by weight. Hence the freezing is conducted at about −6°F.

Fog freezing systems consist principally of cabinets on the top and side of which are installed pipes, fitted with atomising sprays through which circulating low temperature brine is sprinkled. Packaged food is placed on trays fitted between the sides of the cabinet. The high velocity brine is atomised through the spray nozzles or needles creating a fog which extracts heat from the packages on the trays. The fog, when heat laden, condenses and the water drops into a tank below and passes into the solution side of the pump to be re-circulated.

A popular variation of this method incorporates a continuous wire mesh belt of which the ends project outside the freezing chamber. The foodstuffs to be frozen are placed on one end of the belt, pass through the freezing chamber, and emerge frozen at the other end. As the time taken to freeze different products varies, the speed of the belt is adjustable.

Advantages of the Fog System

The great advantage of the fog method is that by means of the atomised spray a comparatively large cooling surface is obtained. Atomised brine impinging at high velocities results in quick heat transfer by utilising the largest permissible cooling surface with

the greatest possible temperature difference.

However, the use of brine as a refrigerant cannot be successfully used on unpackaged fruit for obvious reasons. The refrigerant used in this case is a 50-57 per cent. solution of fully inverted sugar maintained at a temperature slightly above 0°F. The fruit then either passes through a spray of this refrigerant or a whole trayful is dipped and held in a tank of this solution for a few minutes.

Freezing is very rapid; for instance, in the case of strawberries the freezing time is only five to ten minutes. After freezing, the fruits are immediately placed in a specially designed centrifuge where any excess syrup is thrown off the surface of each individual piece.

Polyphase Freezer

A more recently evolved freezer, known as the polyphase freezer, uses a refrigerating medium that is in the liquid, solid, and gaseous state during the operation. An aqueous solution containing glucose and sucrose is chilled and agitated until a finely divided ice phase is formed and distributed throughout the body of the liquid.

The plant takes the form of a horizontal tube, partially filled with the polyphase medium, inside which a closely fitting helicoid conveyor operates. This tube terminates in feed and discharge compartments which are connected by a return conduit. A suitable mechanism regulates the speed of the conveyor and can be adjusted to suit the type of product to be frozen. After freezing, the food is agitated to remove any adhering liquid prior to packaging.

The Individual Freezer

The continuous individual berry freezer consists of a vertical hollow shaft with a series of attached inverted cones and perforated plates. The berries are fed into the top of the machine and drop through a perforated plate on to an inverted cone together with a refrigerated sugar solution. Gravity and centrifugal action cause the berries to roll down the incline to another perforated plate through which they drop to another cone. The refrigerated sugar solution takes the same path as the berries, performing the task of freezing on the way down.

About half-way down the machine the refrigerant is directed down the centre of the shaft where, after passing through a heat interchanger, it starts the cycle all over again. The berries continue to the bottom of the machine by which time they are solidly frozen.

The advantages of direct immersion are obvious, but the disadvantages are that while brine is an excellent refrigerant it cannot be used on fruit. On the other hand, it is difficult to make a syrup that will be of a low enough temperature and not be viscous; refrigerating temperatures must be carefully controlled, as at a high temperature the medium will enter the product by osmosis and at a low temperature the medium may freeze solid.

It is difficult to maintain the medium at a definite constant concentration and to keep it free from dirt and contamination. Suitable immersion freezing media must be edible and capable of remaining unfrozen at 0°F. The most suitable have been found to be solutions of sugars, glycerol, and sodium chloride.

Another type of freezer that has been produced in the last two or three years is unlike any other in that no absorption or compression equipment is required as no refrigerant is used. This method might quite easily become a serious contender for the quick freezing throne in the future.

Briefly, it works on the principle that when a food is subjected to high vacuum, water vapour is released at a low temperature when the residual water contained in the product becomes frozen. The plant is fully automatic, being electrically and hydraulically controlled, using steam as the main operating power.

Air-blast Freezing

In air-blast freezing the principle is the same whether a continuous belt system or the conveyance of whole trolley loads of packets is used. The air blast is cooled to between −30° and −40° F. by circulating air by means of centrifugal or axial flow fans over cooling coils and then directing it over the packets to be frozen, usually counter-current to the direction of travel of the product being frozen.

At the Wisbech company's plant, two tunnels are placed side by side, with a plenum above each tunnel containing the cooling coils which are refrigerated by ammonia. The air is circulated at a velocity of about 80 ft. per second through the nest of cooling coils and over the product by axial flow fans situated in the plenum at the discharge end of the tunnel.

The ammonia surge drum is situated between the tunnels and the whole is contained in an insulated chamber. The feeding ends of the tunnel are situated in another insulated chamber, or pre-cooling room, which is itself refrigerated and in which products are left to cool down to between 40°F. and 45°F. before being fed into the freezing tunnels. The object of this pre-cooling chamber is two-fold:

(*a*) Packaged food can be left under refrigeration while waiting to be fed into the freezing chamber.
(*b*) By reducing the temperature of the packets the overloading of the freezing plant by feeding excess heat into it is avoided.

The discharge end of the tunnel opens into another insulated room which acts as both a packing room and as an air-lock for the storage rooms. The temperature of this packing compartment is well below freezing temperature, but is not so cold that the operatives cannot work in reasonable comfort. At each end of the tunnel are small air locks with swing doors closing off the blast tunnel.

Aluminium trolleys holding stainless steel trays are used for conveying the produce through the tunnel. The trolleys are fed into the feed end air lock manually at specified intervals, and from then on are conveyed through the tunnel mechanically, *i.e.* by motor-driven winch which moves the trolleys one trolley space at a time, according to the known

Packages of frozen foods are stored in the refrigerated warehouse.

time taken to freeze a given product.

This type of blast freezer lends itself not only to the efficient freezing of all types of fruits and vegetables, but also fish, game, poultry, and other meat products.

Processing Operations

The choice of method of quick freezing is less likely to affect the quality of the finished quick frozen food than the harvesting and preparation of the raw materials to be frozen. The organisation that ensures the delivery of the fruit and vegetables at the plant is something not easily devised.

As the result of many years of experimental work we have learned which varieties of a given product are best suited to freezing and under which conditions it must be cultivated and in what parts of the country these varieties can be best grown.

From the processor's point of view this siting is most important because it means that the produce can be harvested practically in the backyard of the factory and so reduce to a minimum any time wasted in bringing the product to the factory. All fruits and vegetables once picked commence to deteriorate, and the quicker they can be packed the better the quality will be.

Quick Frozen Peas

Owing to the comparative shortage of the season, every advantage is taken of early, average, and late cropping peas, the sequence usually being Meteors, Witham Wonders, Kelvedon Wonders, Thomas Laxtons, and Onwards.

When the crop approaches maturity the fieldsman keeps careful watch and informs the factory when the crop should be harvested.

Maturity is determined by means of the tenderometer. This apparatus functions on the principle that it takes less pressure to crush young peas than it takes for old peas. The peas most suitable for quick freezing are those which are of uniform colour (not too light), contain plenty of natural juices, and are free of worm and thistle heads.

There are various ways of harvesting, namely, by ordinary grass mower which cuts the straw just above the ground surface or by torpedo cutter which cuts just below ground surface. This latter is more suited to the shorter strawed varieties.

Having cut the straw the peas can be collected by hand on to lorries or by hay sweep and taken to the viner where they are immediately vined or shelled, put into boxes, and conveyed to the processing line with the minimum delay.

A new combine harvester for peas has been developed in America which claims to reap, shell, and clean the peas at the same time, rather on the principle of the ordinary corn combine-harvester.

On arrival at the factory, the peas pass through the following machines:

1. *Winnower* in which the peas are riddled and blown to remove foreign matter of a light nature such as fragments of leaves, vine, and pods.

2. *Duo-washer* where the peas are subjected to force jets of clean water, washed, and passed over riffleboards to remove any dirt and stones. Foreign bodies such as thistle heads and seed-pods are also extracted by flotation in the machine.

3. *Blancher* where the peas are either blanched by steam or boiling water for sufficient time to kill bacteria and to inactivate enzymes which, if not inactivated, might cause souring and discoloration during storage. However, it is important not to over-blanch, otherwise an inferior product would result having little taste. In order to control this the peas are given a peroxidase test at frequent intervals and the temperature of the blancher set and controlled automatically by thermostat.

4. *Cooler* where blanched peas are given an immediate cooling in fresh running water to prevent overcooking.

5. *Rod washer*, a continuous spray washer; any split peas are discarded through the gaps between the rods.

6. *Re-cleaner* in which any skins, etc., that may have got through the other cleaners are removed.

7. *Quality grader* based on the brine flotation principle in which the young peas float and the old peas sink. The brine strength is controlled automatically, but frequent brineometer readings are taken to make sure the correct strength is maintained. The old peas are by-passed to the canning lines.

8. *Picking tables* where worm eaten or discoloured peas are removed.

9. *Super-cooled flume.* An overhead flume in which refrigerated clean water is circulated, the object being to reduce the temperature of peas before packaging. This water is kept between 35°F. and 45°F. This reduces the load on the pre-cooling and freezing plant.

10. *Carton filler.* Cartons are fed on to the machines, filled with the correct weight, and closed automatically. The cartons are wax impregnated and waterproof.

11. *Wrapper and heat-sealer.* The packets, fed direct from the filler, are wrapped in either waxed paper, cellulose film, and heat-sealed automatically.

The packets are now ready to be put on to the trolleys and frozen. The whole line is interconnected and practically automatic. The same line supplies peas to be frozen loose on trays for packing after freezing in 12 lb. catering packs.

Broad Beans, Asparagus, and Spinach

Broad beans pass through the processing line in the same way as peas but, owing to their tenderness and comparative bulkiness, have to be hand filled. French beans are only accepted for freezing provided they are free from string and blemish, have no developed seedlings, and are of good colour and flavour. Before processing they are graded by machine into five different sizes and mechanically snibbed.

French beans also have to be hand packed. Variations of pack are obtained either by French slicing or cross cut slicing —special machines being used for each type.

Asparagus has to be graded in the same way because of the necessity for different blanching times. The sizes are mixed later so that an "as cut" pack is produced. Considerable scrubbing and washing are necessary to obviate grit and stain and produce a first rate pack.

With spinach leaf very special attention must be given to keep the crop clean as it is easier to eliminate weed in the field than during processing. Succulent leaf, short in the stalk and free from discoloration and foreign matter, is desired. Considerable washing is required to remove all traces of dirt before blanching and packing.

Quick Frozen Fruits

It is the usual practice for fruits fit for freezing to be sorted and graded from those destined for canning which obviates any necessity for double handling; this is particularly desirable with regard to strawberries and raspberries, which bruise easily with excessive handling.

All fruits are sweetened with either dry sugar or sugar syrup, the density of which is dependent upon the acid content of the fruit being handled.

Being in liquid form, syrup gives a better coverage of the fruit, thereby excluding the maximum of air and so slowing up oxidation; it retards enzyme action, and it prevents the evaporation of volatile substances giving the true natural flavour.

When using dry sugar, it is necessary that it and the fruit be thoroughly mixed. A considerable amount of juice is extracted from the fruit to form a glazed coating, which tends to result in a slight breakdown of the fruit when thawing; this is not the case when using syrup, which appears to penetrate the fruit more easily and so enhances the flavour.

From the production angle, the addition of syrup is far more rapid as it can be done mechanically. Moreover, it can be cooled, thereby retarding deterioration of the fruit before it is frozen.

Strawberries should be processed within a few hours of picking to ensure perfect flavour. The fruits selected for freezing should be of good average size, uniformly coloured, perfectly sound, firm, and without blemish. Care must be taken to see that they are plugged correctly, unbruised, and free from dirt.

The procedure for raspberries and loganberries is the same except that they must receive even more careful handling due to their more fragile nature.

Packaging Material

The main problems during cold storage of frozen foods are those of dehydration and "freezer-burn." The two methods of preventing this are glazing or using an air-tight container. The former method is used to some extent with fish and consists of dipping the frozen product in water—the resultant ice glaze being air-tight.

For the latter method various types of containers have been and are being used, *e.g.* tinplate and aluminium cans, aluminium foil, plastic cups, cellulose film bags, and waxed cardboard cartons and cups. Generally speaking, waxed cardboard cartons or cups are the most popular, chiefly because they

Distribution of frozen foods is carried out by insulated vans.

do the job well, can be made to look attractive by special colour printed designs, and are usually the least expensive.

The cartons or cups must be moistureproof, sufficiently robust in construction to withstand normal handling, and capable of sealing and making air-tight.

The sturdiness of the packet and the amount of wax used must not be overdone otherwise the insulation value of the package would retard the freezing of the product, and in consequence reduce the output of the freezing plant.

The size and shape of the carton is also most important, *i.e.* the thicker the packet the longer the product takes to freeze. Rectangular packages about 2 in. thick are preferred both from the processor's point of view and from the distributor's and retailer's angle. Obviously the more uniform the package the easier it is to store in the minimum of storage space.

These small consumer packs are then packed into corrugated board or strong fibreboard cases of uniform size and containing units of one, two, or four dozen packets, according to the popularity of the variety. These outers are finally sealed by glue, adhesive tape, or wire.

In the case of bulk catering packs, the loose frozen product is contained in a cellulose film or waxed paper liner within the outer case, which is then sealed in the usual manner.

Storage Requirements

For storage, an insulated chamber containing an air lock to prevent excess warm air entering the store is required, together with the necessary plant to maintain a temperature of −10°F., allowing a tolerance of 2° either side.

In order to allow reasonably free circulation of air, a 2 in. gap between the stocks of foods and the walls and floor is recommended. This is achieved by the use of "dunnage," which are either strips of wood or specially constructed wooden slatted frames similar to the Army duck-boards.

It is also advisable to use dunnage between individual stacks, the width of each stack being in the region of 5 ft.

The most important point about storage is to avoid large fluctuations in temperature, particularly when dealing with fruits in syrup. Should such fluctuations take place, the possibilities of dehydration are enhanced. The ice crystals within the product tend to grow, causing collapse on thawing, and in the case of the syrup, the sugar tends to separate and form eutectic masses which, owing to the concentration of sugar, are almost impossible to keep frozen.

Distribution and Transportation

To meet consumer demand it is necessary to have an efficient display, supply, and distribution service. Each of these points forms an integral part of the processor's network. Having created this consumer demand, there must be found sufficient retailers who are keenly interested in frozen foods, not only as a means of additional income, but as a means of further equipping his premises to cater for the growing demand. To do this a frozen foods display or store cabinet is essential, which maintains a temperature of 0°F.

Whatever the means of distribution, it is necessary to have suitable cold stores and insulated vans or containers that can be put on lorries. As these insulated vans or containers are often required to hold frozen foods for up to 72 hours, they must be refrigerated. This can be accomplished by installing refrigerating plant in the containers which can be motivated direct from the propeller shaft of the van by petrol or Diesel engine or by electric motor; by installing "hold-over" plates; or by using solid carbon dioxide.

The Aims of the Industry

The aim of the quick frozen food industry is to present a product equal in flavour, nutritional value, colour, texture, and bloom as any that can be picked from the garden. Apart from meeting any immediate demand, this form of preservation can play an important part in the economy of the country.

This can be achieved by selecting the right varieties and seed, cultivating properly, and picking or reaping at the correct stage of maturity; once picked, using all possible speed to process and freeze the article.

The industry demands the perseverance and hard work of all concerned with the ability to absorb and utilise new ideas. Like any new born baby, there is a coddling and weaning period before any growth is experienced. Many retailers, distributors, and processors have blazed and are blazing the trail—many will follow, and so the industry will expand.

The photographs in this article are by courtesy of Smedley's Ltd.

Irish Industrial Research

A GOVERNMENT body which has proved its worth to Irish food manufacturers during the few years of its existence is the Institute for Industrial Research and Standards. Valuable research data, technical advice, and facilities for the testing of raw materials are available, while special problems of processing and standardisation are reported on by a laboratory staff.

At present, the Institute is making a detailed survey of the Irish carrageen moss industry in an endeavour to evolve a moss extract similar to an American product. The people now have to prepare the jelly in the home, but if the new product is evolved, apart from its acceptance in the local market, it might prove saleable in America.

Future Articles

ARTICLES to be published in forthcoming issues of FOOD MANUFACTURE will include the second part of C. Olin Ball's article on "The U.S. Canning Industry from 1940 to 1950" and an illustrated description of a British biscuit factory.

The June issue will be a special one celebrating the 25th anniversary of FOOD MANUFACTURE'S formation in 1927.

News from the Industry

FORTHCOMING EVENTS

British Association

The next annual meeting of the British Association for the Advancement of Science will be held in Belfast from September 3 to 10 under the Presidency of Prof. A. V. Hill, C.H., O.B.E., F.R.S.

International Seaweed Symposium

The response to the proposed International Seaweed Symposium to be held in Edinburgh during 1952 has been very encouraging and definite arrangements have now been made to hold the Symposium from July 14 to 17, 1952.

An organising Committee has been formed with Dr. F. N. Woodward, Director of the Institute of Seaweed Research, as chairman, and Mr. T. W. Summers, also of the Institute, as Secretary. Letters inviting corresponding delegates have been sent to Australia, Canada, Chile, France, Germany, New Zealand, Norway, South Africa, Spain, Sweden, and the United States.

By permission of the University of Edinburgh and Prof. J. Ritchie, the lecture theatre of the Department of Zoology will be used as the meeting place for the Symposium.

Transport Rates Criticised

Speaking to members of the Road Haulage Association at Norwich, Mr. R. B. Brittain, chairman of the National Rates Committee of the Association, which represents road hauliers under free enterprise, said: "Trade and industry hear with alarm of yet a further large increase in the rates charged by the nationalised Road Haulage Executive. The latest 7½ per cent. increase brings the total applied in the last two years to nearly 33⅓ per cent. On the free enterprise side of the industry, a large body of hauliers have found it necessary to apply for an increase of less than half that of the nationalised section during the same period.

"If the Road Haulage Executive had applied the principle of strict economy of operation as practised by free enterprise hauliers, many of the increased costs could have been absorbed. The nationalised juggernaut is fast getting out of control. If the nation's road transport is to be saved for trade and industry the whole of it must be returned to free enterprise. The sooner Parliament applies itself to this task the sooner will the tax-payer be relieved of the possibility of footing the bill every year for the losses incurred in one of the worst experiments ever undertaken in Government control."

Lord Boyd Orr.

Board Changes

The Board of Pest Control announce that, for health reasons, Sir Guy Marshall, F.R.S., has relinquished his chairmanship of the company.

He will be succeeded by Lord Boyd Orr, D.S.O., F.R.S., who is known best for his work as Director-General, United Nations FAO. He was awarded the Nobel peace prize in 1949, and has for some time been interested in the application of science for the control of plant pests and diseases as a valuable means of alleviating the world food shortage, especially in undeveloped countries.

Caramel in Powder Form

A caramel powder in stable form that can readily be blended into products in the normal type of powder mixing machinery has been developed by George Clark and Son. Known as caramel powder and caramel powder (Mocha), these products resist moisture pick-up very well, so that blending into a powder mix can be easily effected.

Flavour Concentrates

An entirely new range of flavour concentrates manufactured by their principals in Switzerland, Th. Muhlethaler Co. of Nyon, is to be introduced into this country by Gale and Mount.

These aldehyde bases, which contain absolutely no diluents, can be suitably diluted with the usual solvents.

A range of samples is available and deliveries can be made from stocks held in London on a duty paid free delivered basis.

Ready-made jellies, incorporating the flavours, have been supplied by the Swiss company for tasting purposes.

Talking Dummies Promote Sales

The latest sales aid now available to Procea bakers is a talking bakerman, in the shape of an electrically operated ventriloquist dummy. A concealed record or hand microphone can be used to give sales talks, the lip and face movements of the dummy being synchronised with the sound.

Instrumentation and Process Control

ELECTRONICALLY CONTROLLED REFINERY UNIT

The new sulphur dioxide extraction plant commissioned late in 1951 by National Oil Refineries, Llandarcy, to produce premium grade kerosene, is believed to be the first refinery plant in the world to have electronic control throughout. This plant, which has been in successful operation for some months, is part of the Anglo-Iranian Oil Company's large development programme in the United Kingdom, and marks a considerable technical advance in instrumentation and process control.

Electronic measuring and control instruments which are used exclusively in the plant for flow, pressure, and level, operate on the electronic repeater system and have been manufactured by Evershed and Vignoles.

The main development is the process controller, a three-term instrument having directly calibrated adjustments for proportional band, integral, and derivative times. The controller has an output of a few milliamperes D.C. and is used to position standard diaphragm type control valves, using air pressure as the motive power. Connexion between the plant and control room is by multi-core telephone cable, the electric signals between the various instruments being in the form of a small continuous direct current.

Designed for an output of 330 tons per day, the Llandarcy plant is now operating at 300 tons daily. The instrumentation comprises 24 process controllers, 17 being concerned with liquid levels, four with flow, and three with pressure. In addition various other quantities are indicated and recorded, and an alarm system is provided.

A comprehensive display of Metal Box containers.

Metal Box Development

The full range of the company's varied activities was attractively demonstrated at the recent three-day exhibition staged by The Metal Box Co. at the May Fair Hotel. Products ranging from cork mats to jig-saw puzzles, from cheque books to textile bobbins, all stem from the company's main business—the provision of a complete packaging service.

One of the most recent developments of particular interest to the food industry is the use of resistant inks for tin printing. Until comparatively recently, the practice has been to package processed foods in plain containers, after which a printed label was fixed to the body of the can. By the development of these new inks, which will withstand the action of water and steam at 240°F. for at least an hour, the labelling of cans is dispensed with.

Another item of interest was the new Garda cap. Designed to meet the need for a vacuum-tight yet easily removed preserve jar lid, it is fabricated of light gauge aluminium and is coated white internally to give it a hygienic appearance. Its extreme flexibility enables it to conform to and compensate for irregularities in the neck of the bottle to which it fits. When the jars are filled, the headspace is sterilised by subsequent heating and the vacuum seal is formed upon cooling. A smooth plastic ring inside the cap's periphery moulds to the jar's rim under heat and pressure, thus completing the seal.

Research has recently been conducted by the company into the manufacture of cork for cap closure discs, as a result of which a resin bonded cork has been evolved which is odourless and tasteless and is eminently suitable for use with all food products.

On the engineering side of cork development, the company had recently introduced cork in reel form either faced or plain for use in automatic cut and insert machines. This technique has now been taken a stage further. Reels, known as Distaks, are cut into suitable widths to enable them to be fed into automatic disc cutting machines which orient and pack cork discs into rods held together by adhesive tape.

Electric Sterilising Chest

A new low-priced electric storage block sterilising chest, developed by The General Electric Co., has been produced. The reduction in cost has been achieved by simplifying the construction and by raising the efficiency of steam utilisation, which has enabled the lagging around the cabinet to be dispensed with.

The chest is particularly suitable for sterilising steel utensils and milking clusters; when it is packed to the recognised density of 4½ lb. of steel utensils per cu. ft. of capacity it will, in normal circumstances, reach a sterilising temperature of 210° F. within 15 minutes. The electrical loading is only 1 kW., so that the chest may be connected to low capacity mains. It is suitable for off-peak operation and is relatively unaffected by power cuts.

Alginates in Food

Some of the colloidal stabilisers and thickening agents used in the food industry have recently become rather difficult to obtain and the new restrictions on imports of these substances may well direct attention to those alternative materials which are easier to buy.

Alginates, for example, are a home product, home grown, harvested, extracted, manufactured, and distributed, and those made by Alginate Industries are already widely used in the food industry for such purposes as fruit squash suspension, ice lollie syrup, ice cream stabilisation, filling creams, piping jellies, meringues, Turkish Delight, jelly sweets, artificial cherries, lemon curd, milk sauces, salad dressings, and soup thickening.

Determination of Flow Rates

Comprised of a vertically mounted tapered bore tube, within which the position assumed by a freely moving float determines the instantaneous rate of flow, Solway Flowrators are available for the measurement of all liquids and gases.

When the fluid is admitted to the Flowrator, the float rises because the differential pressure acting upon it is greater than its immersed weight. The rise of the float increases the area between it and the tube wall, and so reduces the differential pressure. This continues until all the forces acting on the float are in equilibrium. The instantaneous flow rate is read by referring the head of the float to the uniformly divided scale fired on the exterior surface of the metering tube.

Record Export Drive

Record American exports were achieved last year by Crosse and Blackwell from their Peterhead factory, according to data just released. Exports have increased consistently in recent years and even exceed home trade. A strong demand for many canned products, including canned kippers, is expected in the current year.

East Malling Research Station

The subject of hop diseases attracted some 100 members of the East Malling Research Station Association for the Members' Day on March 20. The Director, Dr. F. R. Tubbs, in introducing the day's programme referred with regret to the impending departure of Dr. W. G. Keyworth to take up a post at the Vegetable Research Station.

OBITUARY

Mr. W. Little, who had been with L. Lambert and Co. as outside representative for thirty years, on March 27.

New Dairy for Stockton

One of the most up-to-date dairies in the North of England was officially opened by the Stockton-on-Tees Co-operative Society on March 13, when over 200 members and guests attended. After some introductory remarks by Councillor V. Clough, chairman of the Distributive Committee, the new dairy was formally declared open by Mr. L. A. Hurt, President of the Society.

Serving the Stockton, Thornaby, and Billingham areas, the dairy has a present throughput of 33,000 gallons per week and it is hoped that the 40,000 gallon mark will soon be reached.

Pasteurisation is carried out in the latest type APV Paraflow pasteurisation plant at a rate of 1,200 gallons per hour. All surfaces in contact with the milk, from reception to bottling, including all piping, fittings, tanks, and other equipment, are of polished stainless steel to ensure absolute cleanliness at all stages and to facilitate cleaning.

The dairy is light and airy, all walls are glazed with cream tiles which enhance the excellent natural and artificial lighting, and there is ample space around existing machines; provision has been made for the installation of additional machines in anticipation of future expansion.

Change of Address

Owing to expanding business, Dapag (1943) have opened a new head office at 7 and 8, Old Bailey, E.C.4. Their telephone number remains City 5373-6.

Mr. L. A. Hurt, President of the Stockton Co-operative Society, opens the new dairy.

Edible Oils in Confectionery

Following the recent fat cuts, the British Baking Industries Research Association has now issued (for members only) a review of the edible oils available to the baking industry together with advice on their uses. In this connexion it is pointed out that certain edible oils are rationed and are available only to particular users possessing a permit to purchase. The availability of unrationed oil is also mentioned together with a detailed description of rapeseed oil.

Frying with rapeseed oil, the use of edible oils in breadmaking, fermented goods, Scotch morning rolls, short pastry, confectioners' biscuits, sandwiches containing melted fats, puff pastry, Choux pastry, and cakes, and the use of lecithin in breadmaking are included in the review in which attention is also drawn to the use of mineral oils for tin greasing and lubrication, and the extent to which it may be possible to make some economies in the use of edible oils for this purpose.

APPOINTMENTS

Sir Henry Tizard, G.C.B., F.R.S., has been elected a director of Glaxo Laboratories.

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The appointment of W. and C. McDonnell, of 34/37, Clarendon Street, Dublin, as sole selling agents for Admul glyceryl monostearate in the Republic of Ireland has been announced.

▪

Mr. Felix L. Levy, a director of George Cohen Sons and Co., and its associated companies, has been elected President of the London and Southern Scrap Iron and Non-ferrous Metal Merchants Association. This office was for a number of years held by his father, Mr. Lawrence Levy, who was also a director of George Cohen's.

▪

Mr. William de Back, Vice-President of Food Machinery and Chemical Corporation, San Jose, U.S.A., has been appointed Vice-Chairman and Managing Director of International Machinery Corporation, S.A., Belgium, who manufacture canning machinery under licence from F.M.C.C.

Mr. de Back has for many years been manager of the Anderson-Barngrover Division of F.M.C.C.; this Division has recently been amalgamated with the Sprague-Sells Division into a single Canning Division.

Charles E. Douglas and Co. are the British representatives.

Some of the sales and executive staff who were present at the annual sales conference of Lautier Fils held at the Osterley Hotel.

Food Technology and Catering

GROWTH OF THE BOROUGH POLYTECHNIC

Members of the trade and technical Press were entertained at a luncheon given by Douglas H. Ingall, D.Sc., F.R.I.C., F.Inst.P, Hon.M.I.H.V.E., Principal of the Borough Polytechnic, on April 1, following which a tour was made of the Departments of Food Technology and Catering.

Within two years of the establishment of the Borough Polytechnic in 1892 instruction in bakery was provided. A few years later a Department of Bakery came into being under the title of the National Bakery School, sponsored jointly by the Polytechnic and the National Association of Master Bakers.

The Bakery Department, now renamed the Department of Food Technology to symbolise the widened scope of its work, has been for nearly 60 years the leading centre in England for the training of men and women for the cereal industries, and has attracted increasing numbers of students from the Dominions and Colonial territories as well as from European countries.

The Food Technology Department now embraces three major sections:

1. *Bakery.*—A two-year full-time course leading to the National Bakery Diploma and a three- or four-year course leading to a Higher National Diploma in what can be broadly described as cereal science and technology.
2. *Cocoa, Chocolate and Sugar Confectionery.* — A two-year full-time course.
3. *Biology, together with other food sciences.*—Degree and other specialised courses (Biochemistry, Nutrition, Microbiology, and Hygiene).

The Catering Department offers a second line of development which has emerged through the Domestic Science courses which began at an early date in the Women's Department of the Polytechnic. This has now developed into the Department of Catering in recognition of the increasing importance attached in post-war Britain to training for the catering and hotel industries. The two- or three-year full-time courses (open to men and women) lead to the appropriate examinations of the City and Guilds of London Institute and to the examinations in Waiting of the Hotel and Catering Institute.

Instruction is also given in preparation for the examinations for the Matron Housekeepers Course of the Institutional Management Association. As part of the programme, kitchens have been re-equipped and a training restaurant opened which provides lunches for members of the staff and for visitors.

Since the last war the Polytechnic has been working under great difficulties following the destruction of part of the building by enemy action. A new building to provide much needed extension was sanctioned in 1949 and is being erected by the London County Council, at a cost of about £250,000, to house the departments of Food Technology and Chemistry. The building is now in an advanced stage of construction and it is hoped that it will be finished by August, 1952, in time for the commencement of the new session on September 22.

A Fine Modern Mill

Work is progressing on the new Joseph Rank flour mill at Leith Dock Extension. The 100 ft. high steel structure has been completed and work is beginning on other sections of this modern mill. When completed some 18 months hence, the mill will be one of the finest in the world, incorporating the latest developments in handling and processing techniques. The silo now being erected will be 100 ft. high in reinforced concrete faced with brick.

The operation of this mill will add materially to the activity at Leith and give increasing importance to Edinburgh and Leith as centres for grain and flour handling.

Dismantling the Dome of Discovery

The dismantling of the Dome of Discovery and ten other buildings at the Festival of Britain site has been entrusted to George Cohen Sons and Co.

Instrumentation in the Food Industry

A range of electronic continuous balance potentiometers that have many applications in the oil, chemical, metal producing, and metal processing industries, and which are of considerable interest to the food manufacturer, are being produced by Honeywell-Brown.

Available as single or multi-point indicators, single or multi-point strip chart recorders, or single-point circular chart recorders, these instruments are provided with either electric or pneumatic control forms, including two-position, proportional, integral, or derivative control.

Their design is aimed at producing a self-balancing potentiometer that will give continuous balance, greater sensitivity, greater ruggedness, and higher serviceability with faster speeds of response.

The input from a thermocouple, or any other electro-motive force producing detecting element, is compared with a known e.m.f. from the potentiometer bridge in a similar manner to the older mechanical balance type; this unbalance between these voltages is then converted to A.C. of mains frequency, by a stable mechanical-electrical vibrator, is amplified in both voltage and power, and arranged to drive directly one phase of a two phase motor whose second phase is continuously energised from mains supply.

Motor rotation, caused by as small an input change as 2 microvolts, is arranged to drive the slide wire bridge contactor in such a direction as to balance the opposing electromotive forces. Thus, since they are equal and opposite, and as one is known, the input is also known and the instrument can be calibrated to read directly in terms of the unknown variable.

Protection against Spoilage

Exporters of non-metallic materials often have to contend with spoilage of their products resulting from attack by moulds, bacteria, insects, mites, or rodents. The avoidance of such attack presents a difficult problem because it is necessary in each instance to consider the compatibility of possible protectives with the article itself and with the material from which the container is made.

Moreover, a protective which gives excellent service for one product in a given type of package when it is sent to one area, may break down completely if an identical article in an identical package is sent to an area with different climatic conditions. If at all possible, fungicidal and insecticidal treatment should be given to articles in the course of their manufacture.

Packers can, however, assist in avoiding this type of damage if the article cannot be protected during the manufacture, and guidance on the steps they can take to achieve this is contained in a newly published section of the British Standard Packaging Code, B.S. 1133.

Belting for the Food Industry

Fabricated from heavy cotton duck and thermoplastic synthetic resin, the whole being bonded into a homogeneous structure by processing on a continuous rotary press, the Leonex food belt, manufactured by Rubber Improvement, is non-inflammable and resistant to water, oils, fats and greases, acids and alkalis, and to most fungoid micro-organisms. It can be cleansed with any common detergent; being odourless and tasteless it does not have any deleterious effect even on the most delicately flavoured foodstuffs. Its use is not recommended where materials in contact with the belt are at temperatures above 60°C.

BOOKLETS RECEIVED

A selection of recipes containing Bear Brand honey has been published in book form by L. Garvin and Co.

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The applications of cartons in the food, dairy, and ice cream industries are described in a booklet issued by Mono Containers.

*

A brochure describing the applications of their germicidal equipment has been published by Philips Electrical.

*

The applications of the Sterren brand cheese-making rennet are described in a brochure which has just been issued by Benger Laboratories.

*

Articles on frequency modulation, electronics in X-ray control, and the measurement of moisture in paper are included in the February issue of *Marconi Instrumentation.*

*

The story of the progress of Coates Bros. and Co. has been published in book form to commemorate the 75th anniversary of the company. Attractive examples of the different types of printing ink manufactured by the company are included in this well-produced publication.

*

A four-page brochure, issued by Birlec, deals with the complete range of their products, including both gas and electric fired heat treatment furnaces, arc and induction melting furnaces, inducting heating equipment for both forging and heat treatment applications, and Lectrodryers for drying compressed air and process gases, and maintaining low atmospheric humidities.

Formation of Limited Company

In order to cope more satisfactorily with continually expanding trade, the business carried on for many years past by Mr. Arthur R. Smith, under the style of The Automatic Weighing and Packing Machine Co., has now been formed into a Limited Company and will in future trade as Autopack Ltd.

New Protein Food Company

Mr. J. C. Ferree, the pioneer edible soya flour manufacturer until recently, and for nineteen years chairman and managing director of Soya Foods Ltd., has formed Soya and Protein Products Ltd., of 413-417, Oxford Street, W.1 (Mayfair 1107).

The primary purpose of this company is not so much to promote the sale of full-fat soya flour, but particularly to produce and market new protein and protein balanced foods.

To meet the shortage of milk powder, particularly for the meat, ice cream, and baking industries, the company have evolved "Neolac" containing approximately 30 per cent. lactose, which is being marketed at a very reasonable price.

OBITER DICTA

- If we go on as we are, we shall soon all be eating dog biscuits.—*Mr. R. J. Mellish, M.P.*
- We are living in an age of frustration; there are too many raw deals but not enough raw meat.—*Mr. G. E. Reakes, J.P.*
- With what Buenos Aires throws away daily, it would be possible to feed another Buenos Aires.—*President Peron.*
- We have in Ireland a horde of bandits who descend on the fish and secure all the profits before the fish is on the table. —*Mr. J. McQuillan.*
- Could not the Dome of Discovery be used for storing the good red meat we were promised during the election? —*Mr. A. Tibber.*
- Why export tinned steak from Manchester to Canada and other countries when Britain is so short? It's a mad course. — *Mr. Fenner Brockway, M.P.*
- Cases of food poisoning are on the increase and the drive against dirty handling of food is seemingly being conducted with the gloves on.—*Correspondent to the "Evening Chronicle."*
- Party politics are becoming reminiscent of two heated housewives arguing anent the fairness or unfairness of expected rations before the door of an empty shop. — *Allan Fraser.*
- Will you consider withdrawing eggs marked "H" for "Horrible" because they remain unhatched despite the most strenuous efforts on the part of poultry producers?— *Lt.-Col. M. Lipton, M.P.*
- To helper, mixer, oven man,
  In handcraft and modern production,
  We all extend the welcome hand
  Of practical, helpful instruction.—*Extract from Song of Society of American Bakery Engineers.*
- Don't you think that wrapping and slicing of bread should be abolished at once? The former is useless and tastes the loaf; the latter makes for laziness and is bad for the cutlery trade; wrappers are useless unless for firelighters. — *Correspondent to "Evening Times."*

Chocolate Couverture

Supplies of chocolate couverture made up in compositions suitable for the biscuit, chocolate, chocolate confectionery, ice cream, and bakery industries are available from Margulies Bros., sole U.K. agents and concessionaires for Cloetta.

COMPANY NEWS

At the annual general meeting of Monsanto Chemicals it was recommended that a dividend of 15¾ per cent. be paid on May 22, 1952, to the holders of Ordinary Stock whose names are on the Register at the close of business on April 4, 1952.

*

A review of the working of the company since it was reformed ten years ago was given by Mr. P. V. Kutiak, managing director, at the general meeting of Gale and Mount. He also spoke of future difficulties which would have to be faced in view of the severe cuts in raw materials which were facing many industries today.

*

The year's trading was reviewed by Mr. P. E. Negretti, chairman and managing director of Negretti and Zambra, at the sixth ordinary annual general meeting of the company. It was recommended that the payment of a final dividend on the ordinary shares for the year to September 30, 1951, should be made at the rate of 17½ per cent. per annum, less income tax.

*

Doubts on the priorities given for dollar spending were expressed by the Rt. Hon. Lord Lyle of Westbourne at the 49th annual ordinary general meeting of Tate and Lyle. Some go to buy coal, some to buy films, some to buy tobacco, some for steel, and some for food, of which a few are spent on sugar. He hoped that some dollars could be found for sugar, but they should not be relied on for ever, and every effort must be made to gain freedom from dependence on dollar sugar. A step towards this end had been taken in the signing of the Commonwealth Sugar Agreement.

If de-rationing could not be achieved at home in the near future, then steps should be taken to remove some of the controls which at present prevented refiners from fulfilling completely their true functions. Higher output through more efficient management would only be achieved by freeing industry so that both capital and labour could be put on their mettle.

Food Equipment at the B.I.F.

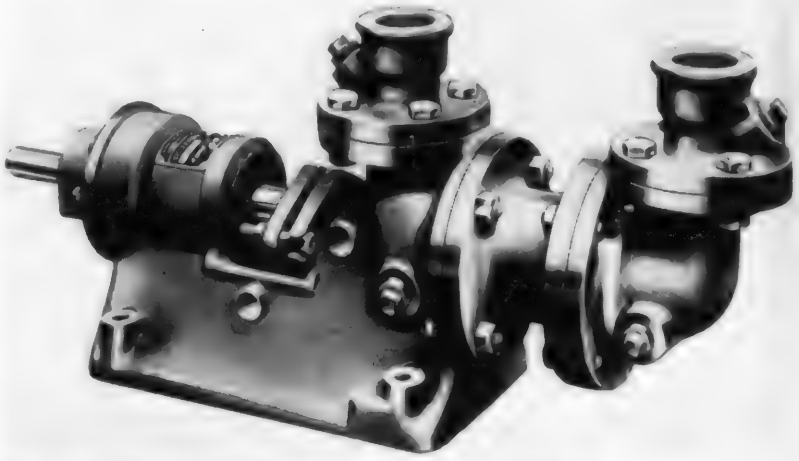
BIRMINGHAM

Pumps and Valves

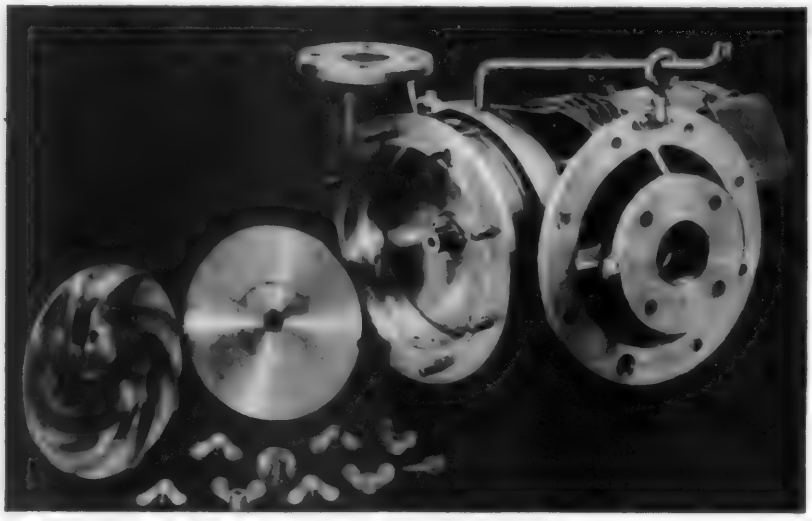
Experimental work within the paper trade has resulted in the production of a pump which is equally suitable for handling most pulped material in suspension or fluids containing fibrous materials. This is one of the new types of pump to be displayed by Mono Pumps on stand D.716.

Another new unit to be exhibited has been produced for bulk handling of liquefied gases. It has already been used with success to discharge bulk quantities of low temperature liquid carbon dioxide from road tanker vehicles. When discharging this liquefied gas, the pressures in the receiving and discharging vessels must be equalised to prevent vaporisation of the liquid.

Other types to be seen at this stand will include those pumps which have been successfully applied to the pumping of fruit juices, hot soups, jam, fresh peas, cream fillings, and fruit pulps, and a small 60 gallons per hour stainless steel unit.



Mono pump for such products as fruit juices, jam, and fresh peas.



Safran self-contained centrifugal pump.

*

As with various other sectional models in different sizes and specifications, the 10 in. cut open handwheel diaphragm valve will serve to illustrate the isolation of mechanism and glandless construction of the Saunders valves, many of which will be displayed by the company on stand D.125. Among the static exhibits will be valves to suit special industries and services.

In the Safran pump division working models of a self-contained set operating from a suspended cradle and other units will be displayed, together with several entirely new models and examples of established types.

Barrier Creams

A range of barrier preparations for the protection of the skin against all classes of irritant materials used in industry will be featured by Rozalex on stand D.706.

Designed to protect against the irritant nature of such foodstuffs as flour, sugar, fruit juices, and vegetables, the barrier preparation is odourless and does not contaminate the food in any way.

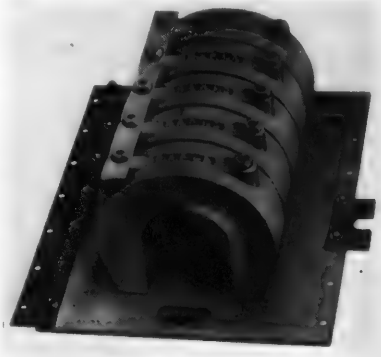
Also to be shown is the Rex dispenser which has been developed by the company to provide an economical and uncontaminated supply of barrier cream.

Magnetic Equipment

An entirely new range of permanent magnetic chutes and plate type separators designed to meet the requirements of such industries as food, confectionery, plastics, and a wide variety of trades encountering tramp iron in the processed or the final product will be displayed on stand C.421 by Rapid Magnetic Machines.

Designed to give maximum magnetic strength coupled with simple installation, the separators are available for wet or dry processes. Three magnet strengths are obtainable and working faces are available with either flush or stepped poles. Requiring no electric current, they operate without cost, and maintenance is reduced to a minimum.

Electro magnetic separators for treating many different materials, together with a new type of vibratory chute for treating fine powders, such as cocoa, salts, powders, and other commodities of a similar consistency that require mechanical motion to precipitate their flow, will also be exhibited.



A magnetic hinge type separator.

A small steam generator.

Industrial Plant

Of the forced circulation continuous water tube type having a rated capacity of 250 lb. per hour at pressures up to 200 lb. p.s.i., the Vapor Clarkson steam generator will be exhibited by Gresham and Craven on stand D.145. This unit is fully automatic and can be driven either by a ¾ h.p. electric motor or by a small I.C. engine. It burns fuel oil or light Diesel grade and treated water should be used.

Another exhibit on the stand will be the compressed air operated Ejectopump, which has many applications in the food industry. When supplied with compressed air at 30 to 50 lb. p.s.i., the unit will deal with discharge heads up to 50 ft. Both these exhibits will be shown working.

*

On stands C.711 and 1321/1220 (outdoor) a range of electrode steam and hot water boilers will be shown by Bastian and Allen, together with a 70 kW steam boiler which will be working in conjunction with a unit heater so that the operation of the equipment can be demonstrated.

Several new items will also be making their first appearance, among which are included a Vapor Phase unit, the Speedylectric mobile steam jet cleaner, and a 30 kW electrode hot water boiler which will be shown in conjunction with an electrode steam boiler to demonstrate the company's method of peak load control. The controls are so arranged that when both units are in operation, the total load will not exceed a predetermined demand. It is arranged so that the steam boiler will take only the surplus load and when the hot water boiler is switched off, the steam unit will take the whole of the load.

The Speedylectric mobile steam jet cleaner.

*

A range of steel castings, small tools, permanent magnets, special tool steels, and axlebox liners will be included in the exhibits of Edgar Allen and Co. on stand D.536. The engineering department will provide an interesting display of a revolving model of a Stag tube mill for fine grinding, while the company's permanent magnet department will show a wide range of magnets of various types together with a panel in which representative magnets for scientific instruments, etc., will be linked up with illustrations of the actual products in which these magnets are incorporated.

*

A display of stainless steel equipment for the food industry and other industrial processing operations will be featured on stand D.537 by W. P. Butterfield. This will include mixers, boiling pans, jacketed pressure vessels, and storage tanks. Other products manufactured by the company will be exhibited on stand A.314.

*

The two main exhibits to be shown by Foster, Yates and Thom on stand D.504 are the Rotocube industrial mixing machine and the 50 ton fully automatic plastic moulding press. The mixing machine is used mainly for mixing dry solids through the medium of a slowly rotating cube-shaped drum mounted diagonally on trunnions. Internal impellers can be used when blending ingredients which do not flow readily or which have a tendency to agglomerate. In addition to the improved accuracy of mixing, considerable reductions in blending times are claimed for the machine, and the effects of attrition or pulverising are reduced to a minimum.

The moulding press is a recent addition to the company's range of hydraulic presses and will mould up to six articles, having a total volume of 24 cu. in. at each pressing.

The Rotocube industrial machine is used mainly for mixing dry solids.

*

Manufactured to meet the need for a steam jacketed pan with a self-contained mixing gear, the mixing pan to be featured by The Taylor Rustless Fittings Co. on stand B.504 is representative of the stainless steel food and chemical plant manufactured by the company. Having a capacity of 25 gallons, the whole pan tilts on trunnions for emptying and the head with mixing paddles can be tilted backwards so that the pan is free to tilt for emptying.

Stainless steel steam jacketed mixing pan with self-contained mixing gear.

Left: **A Conveyancer fork truck handling maize meal in a cereal warehouse.** *Above:* **A Ransome fork lift truck designed for use under congested conditions.** *Right:* **The Beanstalk mobile rising platform for use by the maintenance engineer and others working at ceiling level.**

Mechanical Handling

A full range of fork lift trucks will be exhibited on stands D.616/717 and 1358 (outside) by Conveyancer Fork Trucks. Among those to be demonstrated will be one incorporating an automatic turbo drive, various types of battery electric truck, a petrol engined truck, and a wide range of materials handling attachments, including boom, crane, squeeze clamp, rotating head, side shifter, and shovel.

During the Fair, the company will be showing a 35 minute 16 mm. sound film dealing with the manufacture and applications of fork trucks.

■

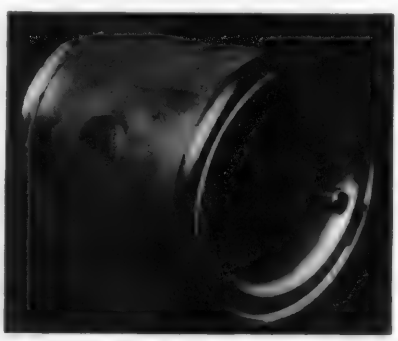
In addition to lawn mowers, tractors, and other farming implements, Ransomes Sims and Jefferies (stand A.502) will also be exhibiting three types of fork lift trucks, a platform truck, and an electric tractor. These latter exhibits will be shown on stands 1216 and 1317 (outside) and will include the newly developed fork lift truck which has been specially designed for use under congested conditions in narrow aisles and gangways.

■

The maintenance engineer is often faced with the need to reach work at ceiling level or high up on walls. Access to such places, hitherto often necessitating the erection of timber towers, trestles, cradles, or scaffolding, is simplified by the use of the Beanstalk mobile rising platform. Manufactured by the Mechanical Developments Division of William Moss and Sons, this working platform can be seen on stand D.738. A pump, manually operated from the platform by means of a lever or electrically, passes fluid under pressure directly into the ram, raising the operator to any desired working height up to a maximum of 18 ft. to 30 ft. according to the size of the model. To descend, the operator simply turns a pressure release control which allows the fluid to return to the reservoir.

When the ram is retracted, the platform and handrails can be quickly folded down and the legs "scissored" together, permitting the platform to be wheeled through doorways or under any obstruction as low as 6 ft. 6 in. from the ground, with the exception of the two largest models. Mounted on rubber tyred castors, it can be taken into small lifts and manoeuvred through narrow passages, gangways, and other confined spaces.

■



The Essex Aero fruit storage drum.

Representative types of the Magcrate bottle and bar crates will be displayed by Essex Aero on stand C.237. Manufactured with magnesium slats riveted to pressed aluminium base and nesting tray, the crates are light yet strong, the largest weighing under 6 lb. Examples of transportable containers of light and ultra light metals, wheeled and non-wheeled bins, pilferproof transit cases, electrical equipment trays, and refrigerator trays for internal factory use will also be exhibited together with a fruit storage drum, weighing 53 lb. empty, which is designed to hold 400 lb. net weight of fruit. A new type of bung seals the large pouring aperture and is secured by a special fitting from the outside, thus eliminating the conventional screw thread bung.

Lacquers for Food Cans

Some samples of their range of lacquers for the food canning industry will be shown on stand B.402 by Arthur Holden and Sons, who have recently carried out a great deal of work on the development of synthetic lacquers.

Having a combined acid and sul-

phur resistance, these synthetic lacquers have much greater adhesion to difficult metals, such as aluminium and electrolytic tinplate, than conventional lacquers. Furthermore, such a lacquer film does not soften during the process of sterilisation and can therefore be used for solid meat packs.

Industrial Brushware

In addition to their usual range of brushes for all industrial purposes, The Kleen-e-ze Brush Co. will also be exhibiting on stand D.143 the Kez gun for the cleaning of tubes, the flow breaker, used to achieve optimum heat transference, the Keza tube cleaners and burnishers, and Brush Welt for the exclusion of dust and draughts.

Motors and Electrical Equipment

The central feature of stand C.511/410, occupied by the British Thomson-Houston Co., will be a correctly scaled reproduction, over 16 ft. high and 14 ft. in diameter, of a 62,400 kvA vertical water-wheel alternator. This exhibit will form a background for the company's display of electric equipment for industry, ranging from switchgear for industrial power distribution to Mazda lamps and lighting for all industrial applications.

Squirrel cage and slip ring induction motors in various sizes are to be exhibited, together with electric control equipment, photoelectric counters and sorters, a range of electronic timers for industrial process control, and a number of industrial electric heaters.

*

A typical Diesel power-house layout, a range of fusegear, unitised switchgear cubicles, rectifiers, induction heaters, industrial motors, and a selection of domestic appliances will be exhibited by the English Electric Co. on stand C.613/512.

Using a single air blast cooled oscillator valve, which eliminates the maintenance troubles inherent in water cooled valves, the new 25 kW high frequency induction heater is highly versatile for use in the production line. The electrical features comprise H.T. voltage and output impedance matching, continuously variable over wide limits, and also facilities for providing kvA/kW ratio suitable to the applications.

*

Between 40 and 50 motors, covering all requirements, will be displayed by Newman Industries on stand C.518.

In addition to the two working models showing the application of a motor driving a gear unit and of the fractional motor, the company will be showing slip ring or squirrel cage motors, totally enclosed standard industrial motors, fractional horsepower motors, barrel type flameproof and standard flameproof motors, and loom motors.

*

Among the wide range of exhibits shown by The Electric Construction Co. on stand C.708 will be a self-synchronising and automatically regulated motor alternator set, complete with a direct-on starter for the motor and a control cubicle and rectifier; a patent inner-cooled plating rectifier; three standard induction motors showing various types of enclosure; a number of push button contactor type direct-on starters for squirrel cage motors; a range of indicating instruments, comprising moving iron and moving coil ammeters and voltmeters with associated ammeter shunts; and a 12 phase mercury-arc rectifier unit, complete with control panel and resistances.

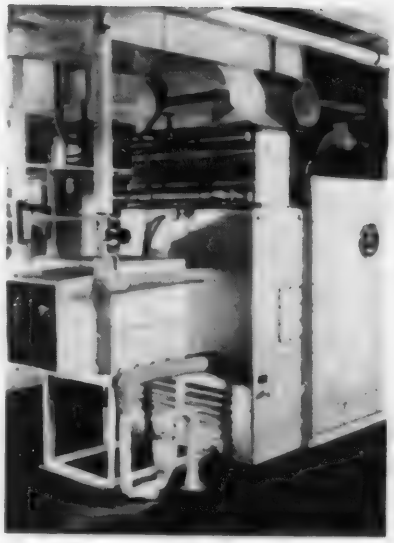
The Electric Construction direct-on starter for squirrel cage motors.

Industrial Ceramics

A comprehensive display of electrical porcelain insulators and porous ceramic materials will be found on stand C.411/310, where Doulton and Co. will also be exhibiting a new type of diffuser material, a model conveyor for the cement and other industries, and large size porous tubes.

Drying Plant

Three different examples of drying equipment will be featured by Birlec on stand D.509. Two of the units will be of the dual-adsorber type, *i.e.* with two beds of adsorbent material operating in turn, so that while one bed is on drying duty, the other can be reactivated. The third unit is to be a model drier for installation in a pharmaceutical plant in Brazil which will maintain a suitably dry atmosphere at less than 20 per cent. relative humidity in a small vial filling cubicle.



A Birlec Lectrodryer controlling humidity in a pharmaceutical plant.

In addition to these major exhibits, the company will also be showing a number of small, single adsorber units used for intermittent drying duties in research or small production work.

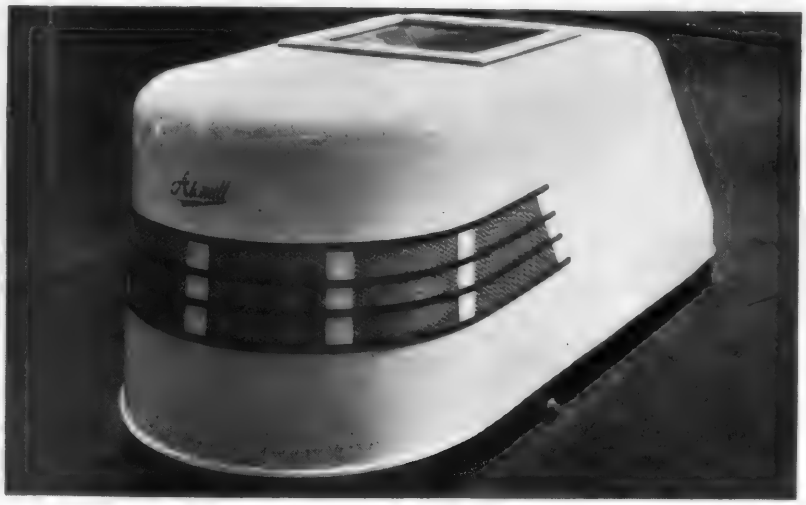
Plastics

The theme of the Imperial Chemical Industries stand (D.412) at Castle Bromwich will be the variety of properties possessed by plastic materials, and their wide range of uses, especially for the engineering industry. Examples of articles made of Alkathene, P.V.C., Perspex, nylon, Fluon, and moulding powders will be used to illustrate this variety.

The London stand at Earls Court (V.3) will be designed to enable customers to meet I.C.I. representatives and discuss business and production problems.

Grinding Machinery

A selection of machines from current production that is representative of their scope of crushing equipment will be displayed by British Jeffrey-Diamond on stand D.328. Among these will be included the Atomill fine grinder which, from feed material of sizes up to ½ in. cube, will reduce certain materials to 300 B.S. mesh in one operation; a new model of improved design, but smaller in size and capacities; and the Microid Atomill, a high speed swing hammer pulveriser employing the same principles of construction as the Atomill. Although designed principally for laboratory work, it is



The new intermediate Atomill.

robust enough for small batch production. This unit is capable of reducing a variety of materials, ranging from samples weighing a few grams to those weighing several pounds to products between 50 and 300 B.S. mesh, depending upon the type of material.

Freight Transport

Enquiry bureaux, staffed by experts in passenger and freight transport, will be operated by British Railways on stand S.1 (Earls Court), stand A.13/14 (Olympia), and stand C.401 (Castle Bromwich).

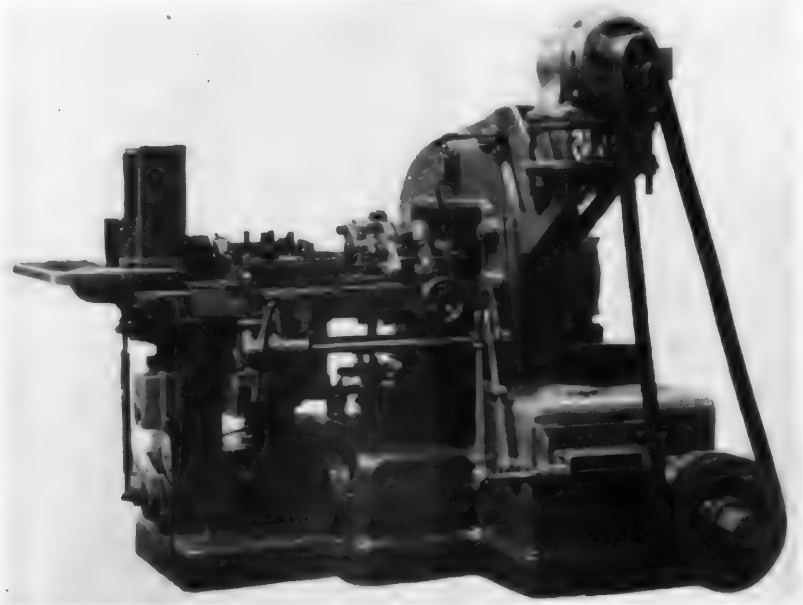
The Castle Bromwich stand will also represent British Road Services and the Docks and Inland Waterways Executive.

Automatic Can Machinery

An all crank machine, producing round, square, or irregular shaped can bodies at a very high rate of speed, will be featured by E. W. Bliss (England) on stand D.603. In the production of round can bodies for sanitary cans, where it is most generally used, a speed of 300 a minute is easily attained and consistently maintained.

All motions are short, actuated by eccentrics eliminating the wear, noise, and limitations as regards speed that are inherent with cams. All bearings are bushed and the driving mechanism runs in an enclosed oil bath. Soldering attachments, with inside or outside solder horns, can be supplied according to requirements. Notching attachments, edging attachments, and forming wings, right and left hand, are driven by independent right and left shafts, so that the movements are direct and "play" and "lost motion" are eliminated.

Other exhibits will include a gang slitting machine, an inclinable power press, and a selection of bench presses.



The Bliss automatic can body maker.

Metal Products

A wide range of equipment will be displayed by Fredk. Braby and Co. on stand B.317/416, included among which will be steel drums for the oil, paint, and chemical industries, perforated metals, fabricated platework, aluminium welding, sheet metal work, and pressings, industrial aluminium holloware, steel sink, Bar-Form desk, cisterns and tanks, and galvanised culverts.

A working model of an exhauster for the food industry made by their subsidiary company, the G. C. Engineering Co., will also be exhibited.

Fuel Economy

On stand D.239, Senior Economisers will be exhibiting their various types of economiser for pressures ranging from atmospheric to over 2,000 lb. p.s.i. All the economisers to be displayed are characterised by gills which, when assembled, form straight, uniform gas passages and hence give exceptionally clean heating surfaces.

Other smaller exhibits will include a section cut through the lens ring joint used on the Twintube economiser, a section through a handhole plug, and a section through a butt weld as employed on the Welded economiser. Quarter scale models of each type of economiser will also be shown.

OLYMPIA

Colour Measurement

The Lovibond Tintometer, the Lovibond Schofield Tintometer, and the all purposes and pocket type Lovibond comparators will be the main exhibits of The Tintometer Ltd. on stand B.13. In addition a number of accessories, such as fused glass cells, artificial white light equipment for using the comparator at night, the spinning device for measuring unevenly coloured samples, and the resazurin comparator for milk testing, will also be shown.

Among the new exhibits will be an addition to the company's range of books on colour, "The C.I.E. International Colour System Explained"; a small instrument for grading the colour of solids against a restricted range of prearranged standards; a new type of comparator which can

be used to test the colour of water white liquids; and a new turbidity tester used for testing turbid solutions which are also coloured.

Tablet Machines and Coating Pans

A new model to be shown by Manesty Machines on stand D.35 is the pelleting press, which has a filling depth of 2¼ in. and is capable of heavy pressures. Tablets up to a maximum of 2¼ in. in diameter can be made at the rate of 32 per minute, but with multiple punches, higher outputs can be attained.

Another recent model is the bench-mounting tablet machine; this unit, which is totally enclosed and fitted with plastic guards to the punches and lower plunger, is suitable for tablets up to ¼ in. in diameter, with an output of 65 tablets per minute.

Rotary tablet machines for slugging and confectionery purposes, and for general pharmaceutical work, are also to be included in the company's display, together with mixers, oscillating granulators, coating pans, various types of punches and dies, and a selection of automatic water stills heated by gas, electricity, or steam.

Packaging and Stationery

In addition to a comprehensive display of personal and table stationery, cards, books, office equipment, and labels, John Dickinson and Co. will also be showing on stand M.29/38 a range of packing bags and wrappings featuring in particular Karrier bags, counter bags, Christmas bags and wrapping, and the new Seal-Easi transparent bag, printed for wages or plain for packaging purposes.

*

A full range of sealing machines, including the new Lightening automatic sealer designed to pack anything from the smallest parcel to the largest bale, will be included in the display of stationery and gumstrip sealing to be shown by Samuel Jones and Co. on stand M.49. The Lightening labeller for label moistening, self adhesive sealing tapes, and Samson adhesives will also be featured and will prove of interest to packers of all kinds of merchandise.

Chemical Products

The main feature of the Shell Chemicals stand (C.30) will be a control panel of the type used at the company's Stanlow plant. Flanking this will be two large colour transparencies depicting a refinery panorama and a typical complex chemical plant where petroleum based raw materials are processed into chemicals for industry.

*

The technical service provided for customers is the theme of the Imperial Chemical Industries stand (C.14). Three-dimensional models are used to illustrate how the company's technical and research resources are placed at the disposal of customers in all parts of the world.

Stainless steel mixing equipment.

*

Products which will be featured by Monsanto Chemicals on stands C9/10 are aspirin and salicylates, essential raw materials for the pharmaceutical and dyestuffs industries; the Aroclors, a range of 12 chlorinated diphenyls; the Silesters, organic silicon chemicals used in the foundry trade and in the manufacture of refractories; and two new textile chemicals, Syton 2X and Stymer.

In addition to these specially featured chemicals, the company will have on display a wide variety of other products, including agricultural chemicals, preservatives, detergents, general chemicals, placticisers, and Lustrex polystyrene moulding crystals.

*

A range of pharmaceutical and industrial fine chemicals will be displayed by Whiffen and Sons on stand C.24. The latter group will include hydrazine hydrate, manufactured by their associated company, Genatosan; this is a basic raw material for chemical synthesis. It is already being used in large quantities for the manufacture of maleic hydrazide (a plant growth inhibitor), A.Z.D.N. (an expanding agent for rubber and plastics) and derivatives used as soldering fluxes.

*

The D.C.L. Industrial Group on stand C.15 will illustrate the scale of the companies' activities — on the bulk production of D.C.L. alcohol, of methylated spirits, and of the wide range of organic solvents, plasticisers, and intermediates made by British Industrial Solvents, matched by the output of British Geon and British Resin Products from their works at Barry, and by the resources of the new Grangemouth plant of British Petroleum Chemicals.

The production and distribution of yeast and of the two forms of carbon dioxide will be shown and Distillers Company (Biochemicals) will contrast the minute size of the penicillium mould with the huge plant required for its commercial production.

Office Machinery and Equipment

The entire products of the Roneo organisation, including the Roneo Neopost Section, will be found on stands F3/16. In the Machines Department will be exhibited several duplicators and the electronic stencil which is capable of reproducing direct, without negatives or screens, any form of illustration or type, including photographs, drawings, maps, and type matter. The visible records display will feature visible card record systems, visible strip indexing equipment, visual control charts, Linkdex indexing systems, and machine posting trays and trolleys.

Emphasis in the Steel Department will be placed on the Visible-80 filing system; also in this section will be shown for the first time a new series of flexible desking.

A complete range of hand and electrically operated Neopost postal franking machines, a cheque signing machine, and the company's National Insurance machine will also form part of the comprehensive display to be found on these stands.

World Food News

Whale Oil Prices

The Norwegian whaling companies have sold 6,000 tons of whale oil to Denmark and 9,000 tons to Sweden at £120 a ton. Last year the Ministry of Food paid £100 a ton for British and Norwegian whale oil. This winter, the Ministry has paid £110 for the British Antarctic expeditions' oil, but no sales agreement has yet been concluded with the Norwegian authorities.

During the first ten days of this year's Antarctic whaling season, the ten Norwegian expeditions produced altogether 147,650 barrels of oil, compared with 153,700 barrels for the first 16 days of the 1950-51 whaling season.

New Russian Food Trading Agency

The Russian Ministry of Foreign Trade has announced the establishment of a new agency named *Procintorg* to handle export and import transactions in a number of food products other than grain.

It has been assigned the duty of administering foreign trade in sugar, tea, cocoa beans, coffee, spices, fruits, canned goods, meat and fish products, fats, wines, and livestock.

Trade operation in the designated food products has been transferred to the new agency from the existing *Exportkhleb* (Grain Export Trust) indicating that it is a decentralising move, perhaps designed to cope better with an expansion of the food trade.

Food Technology in Australia

The advancement of scientific and technical aspects of the Australian food processing, manufacturing, and distributing industries, the dissemination of knowledge, and the investigation and application of solutions to problems confronting the industry are some of the objects of the Food Technology Association of Victoria.

In order to organise effective training in the form of full-time courses in food technology, a sub-committee has been appointed and has already considered the broad outline of suitable subjects. It is hoped that, with the co-operation of all manufacturers, educational authorities, and the Government, a school may be founded which will become the training ground for future technologists.

Committees have also been established for the purpose of considering Food Standards and Regulations. Among matters at present being considered are preservatives in food, standards for canned fruit and vegetables, and export standards for ice cream mix.

East German Chocolate Substitute

Vitalade, a chocolate without chocolate, is being publicised in the East Berlin papers.

The product is said to contain 38 per cent. fat, 41 per cent. carbohydrates, and 12 per cent. albumen. It is being produced by a State-owned chocolate factory.

Milk Products in Ireland

A factory is to be built by Nestlés at Letterkenny, Co. Donegal, which it is hoped will be in production this year.

A site was selected following an invitation to start the project there by the development association of the town, and farmers in the district have promised their co-operation.

Brand milk products of the company will be manufactured and later the factory is to be extended for the production of tin containers, although for a time these will be imported from Britain.

Corn Canning Plant

A new canning factory for sweet corn has been opened at Gisborne, New Zealand. It will can the harvest of about 1,200 acres of sweet corn planted on the maize belt of the Poverty Bay flats, and aims to turn out six million cans this year. It is equipped with the latest American machinery, said to be the first of its kind to leave the U.S. American hybrid seed was imported into New Zealand for the sowings. It is believed that there are great export possibilities for canned sweet corn; timber from the Rotorua mills will be used for the cases in which the product is to be sent overseas.

Approved Food Colours

Production of colours certified for use in foods, drugs, and cosmetics under the Food, Drug, and Cosmetic Act of 1948 reached 1½ million lb. last year, the expansion having been continuous since 1940 when production was about 550,000 lb. The list of colours approved now numbers 19 but in addition 68 colours have been approved for use in drugs and cosmetics only, and 30 colours for use in externally applied drugs and cosmetics only.

The list of current FD and C colours is now as follows. The first name is the FD and C designation and the second in parentheses the common name: Blue No. 1 (Brilliant Blue FCF); Blue No. 2 (Indigotine); Green No. 1 (Guinea Green B); Green No. 2 (Light Green SF Yellowish); Green No. 3 (Fast Green FCF); Orange No. 1 (Orange 1); Orange No. 2 (Orange SS); Red No. 1 (Ponceau 3R); Red No. 2 (Amaranth); Red No. 3 (Erythrosine); Red No. 4 (Ponceau SX); Red No. 32 (Oil Red XO); Yellow No. 1 (Naphthol Yellow SN sodium salt); Yellow No. 2 (Naphthol Yellow S potassium salt); Yellow No. 3 (Yellow AB); Yellow No. 4 (Yellow OB); Yellow No. 5 (Tartrazine); Yellow No. 6 (Sunset Yellow FCF); and Violet No. 1 (Wool Violet 5BN). The violet is the latest addition to the range and was approved in 1950.

Algerian Sugar Refinery

The French Finance Ministry has authorised the building of a sugar refinery in the Oran area of Algeria.

The new factory, which is due to start production in 1953, is expected to produce 5,000 tons of sugar a year, with a refining capacity of about 300 tons of sugar beet daily.

New Australian Canning Plant

The Committee of Direction of Fruit Marketing, which handles almost all Queensland's exports of canned fruit, plans to build a new A£70,000 cannery at Rockhampton. The plant will initially have one complete processing line and two pineapple treating machines.

Sausage Skin from Seaweed

A new type of sausage skin made from Norwegian seaweed will shortly appear on the world market, according to the director of the seaweed processing factory A/S Protan at Drammen, South Norway. The skin is edible, and is 29 times lighter in weight than the cellulose paper generally used today.

In Germany a factory is being built to manufacture the new sausage skin at the rate of 22,000,000 yards a month. The manufacturing process is patented in Germany, and is the result of two years of experiments. The seaweed which is used is of a type produced only in Norway. This summer between 800 and 900 men will be engaged by the company in collecting seaweed around the Norwegian coast. The company has two artificial drying plants for seaweed, at Bergen and Kristiansund, and is now to build another one, at Helgeland in North Norway.

Civic Dinner for Antarctic Explorers

The members of the Norwegian-British-Swedish Antarctic expedition sailed to Oslo from Newcastle on February 28, where a civic dinner in honour of the expedition was given on March 1.

OVERSEAS ENQUIRIES

Agency for Biscuits

A St. John's firm, A. B. Baird, Ltd., 322, Duckworth Street, Newfoundland, are interested in obtaining an agency for a United Kingdom line of biscuits which are not already retailed in Newfoundland.

United Kingdom manufacturers interested in this enquiry are reminded that before foodstuffs are offered for sale in Canada they must comply with the provisions of the Food and Drug Act and other measures designed to ensure the purity of imported food products.

Firms interested should write direct to Mr. I. Carter, director of the company, giving full details of ranges, prices, and samples.

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Cider for Mauritius

Chue Wing and Co., of 18, Queen Street, Port Louis, are interested in representing a United Kingdom manufacturer of cider on a sole agency basis.

United Kingdom firms who are interested in this enquiry should write direct to the company, giving full particulars of their products, together with price lists and catalogues.

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Coffee Preparing Machinery

Quotations for coffee pulpers, hullers, driers, and classifiers are required by Westfeldt Bros., P.O. Box 1100, New Orleans, Louisiana.

Interest United Kingdom manufacturers should communicate direct with the company (for the attention of Mr. Wallace Westfeldt) sending quotations in dollars c.i.f. (East Coast of S. America Ports and West Coast of S. America Ports), indication of delivery dates, catalogues, and technical explanations.

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Essential Oils

The Liquid Carbonic Corporation of Cuba, P.O. Box 230, Prado 152-154, Havana, have expressed a desire to import from the United Kingdom green lemon, ripe lemon, terpeneless lemon, California lemon, California orange, and orange for use in the manufacture of aerated beverages. Quantities said to be required are about 2,500 to 3,000 lb. of lemon and 500 lb. of orange per annum.

Terms of payment would be preferably by sight draft, but the Havana firm would consider opening a Letter of Credit for the first order.

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Tinned Meats

Quotations for all types of tinned meat are required by H. S. Fulcher and Co., 198, South Main Street, Memphis, Tennessee.

Foodstuffs exported to the United States have to conform to the provisions of the U.S. Food, Drug and Cosmetic Act.

Firms interested in this enquiry should communicate direct with Mr. M. K. Evans of the United States firm sending quotations in dollars c.i.f., indication of delivery dates, catalogues, and samples.

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Abattoir Equipment

The abattoir in The Hague is to be modernised, and new refrigeration plant is to be installed.

Offers of equipment should be made to Techisch Hoofdambtenaar Openbare Slachthins Slachthuisplera, The Hague, from whom details of the requirements may be obtained.

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Chocolate Bars

Wilson, Harding, and Kennedy (Mr. R. Harding), 699, South Main, Memphis, a firm of food brokers operating in the mid-South, have expressed interest in receiving quotations for chocolate bars to retail at 5 to 10 cents.

United Kingdom manufacturers who are in a position to do so should communicate direct with Mr. R. Harding sending quotations in dollars c.i.f. New Orleans, indication of delivery dates, and samples by air mail.

Glycerine for Butter Cream Candies

Recent research being conducted under the joint sponsorship of U.S. Department of Agriculture and the National Confectioners' Association points to an effective use of glycerine in lengthening the shelf-life of butter creams by suppressing free fatty acid formation.

Almost all the ordinary butter creams, the report states, showed the presence of approximately one per cent. free fatty acids after five to ten weeks' storage. This amount is enough to impart a disagreeable taste and odour to the creams. Antioxidants, although effective against the formation of peroxides, had no inhibiting effect on the more serious problem of fatty acid formation.

Among a number of materials tried, only glycerine gave any indication of suppressing free fatty acid formation. After eight weeks, treated creams showed 0·5 per cent. free fatty acid value as compared to one per cent. for controls. Additional tests on butter samples stored at 86°F. showed acceptable shelf-life prolonged from nine to fourteen weeks with one per cent. glycerine; two per cent. glycerine gave indications of keeping longer.

Hungary Ends Meat Rationing

Meat rationing was abolished in Hungary as from February 18; all kinds of meat are now available at controlled prices. This marked the end of all rationing in Hungary.

U.K. Frozen Food for America

Quick frozen English strawberries are now on sale in New York shops, representing the first invasion of the U.S. frozen food market by Britain. These were followed by shipments of frozen English sole. The sole constitutes the main effort to capture a corner in the luxury grocery market.

The foods are first being introduced in New York, but distribution throughout the United States is planned. If they are successful they will make a worth while contribution to closing Britain's dollar gap.

New Armenian Food Factories

Several new foodstuffs factories are to be opened in the Armenian Soviet Republic. They include a margarine factory in Yerevan, the capital, a confectionery factory in Leninakan, and a bread factory in Kirovakan. The already existing bread, butter, preserves, confectionery, macaroni, and mineral waters factories are being enlarged and improved.

A wine factory is being built at Ashtarak, the wine industry centre of the Valley of the Middle Aras River, and will start production in the third quarter of this year. Other wine factories will be established in Yerevan, Alaverdi, and on the Mokoyan State farm of the Echmiadzinskji Rayon.

Synthetic Milk for Pig Rearing

A product that would have far-reaching implications in increasing the annual production of pork was recently announced by Herbert G. Luther, of the Chas. Pfizer and Co. Laboratories, U.S.A.

Known as Terralac, the synthetic milk was developed in an effort to bring terramycin into the baby pig's ration early in its life, antibiotic feeding having been proved to give improved growth rates.

By the use of Terralac, baby pigs, which normally suckle for 56 days, can now be taken from the sow within 48 hours after they are born. Litter sizes, previously limited by the sow's milk production, can now be expanded to the sow's capacity to produce piglets.

The results of tests carried out in the company's laboratories are excellent. By removing the sow and feeding the young pigs on terramycin-fortified milk, Luther's experiment reduced infant pig mortality to 5 per cent. as contrasted with the national average of 21 to 33 per cent. In addition to stimulating more rapid growth, terramycin also reduces the incidence of baby pig diseases.

It was also noted that by taking the pigs off the sow's milk and giving them Terralac, weanlings were produced which, at the age of eight weeks, were from 10 to 35 per cent. heavier than normal sow-fed animals.

News from the Ministries

Resignation

Sir Harold Sanderson, who was appointed Director of the Rice Division in the Ministry of Food on January 1, 1941, has tendered his resignation as from March 31, 1952.

Fat for Small Bakers

As announced by the Minister of Food in the House of Commons on March 31, it has been decided that those small bakers and confectioners whose allocations of fat before the recent reduction were 3 cwt. or less per eight-week period will now be exempt from the reduction while those with an allocation of over 3 cwt. will receive at least 3 cwt.

The allocations will be adjusted with effect from February 24, 1952, which is the date on which the reductions became operative.

New Meat Products Order

The Meat Products Order, 1952, which replaces the Meat Products and Canned Meat (Control and Maximum Prices) Order, 1948, as amended, has been made with effect from March 16, 1952.

The new Order prescribes revised prices for most meat products and continues the prohibition on the manufacture and sale of meat products other than "specified" or "excepted" products. It differs from the old Order in that it is designed to treat the home manufacturer and the importer alike as regards the type of meat product that may be sold, and the maximum prices and minimum meat contents that are prescribed.

The following are added to the list of "excepted products" which may be sold free of price control: liver sausage, brawn, cured chaps, cured eyepieces, cured pigs' head meat, haggis, cooked pigs' feet, cow heel, canned haggis, canned brawn, imported canned offal other than tongues, and any meat products containing less than 20 per cent. of meat.

Canned rabbits and canned poultry are freed from price and other controls imposed by the Order as a result of the removal of poultry, game, rabbit, hare, venison, and goats' flesh from the definition of "meat."

The Order contains two sets of price schedules. The first set operates up to and including September 13, 1952, and prescribes revised maximum prices for most meat products already subject to price control. Among the products whose prices are unchanged are beef sausages, pork sausages, and luncheon meat (other than pork luncheon meat).

The second set of price schedules which operates on and after September 14, 1952:

(*a*) brings under price control a number of imported meat products such as pork in natural juice, jellied veal, and continental or fancy sausages, which are at present licensed for sale free of price control; the licences for the products concerned will be withdrawn not later than September 13;

(*b*) repeats the maximum prices prescribed in the first set of schedules with the exception of the price of luncheon meat (other than pork luncheon meat) which is reduced;

(*c*) prescribes minimum meat contents for a larger number of meat products in addition to those already prescribed in the first set of schedules.

The interval of six months between the date of operation of the first and second set of price schedules is provided to enable traders to dispose of stocks acquired during the absence of price control and to give manufacturers time to prepare to comply with the minimum meat content requirements of the new Order.

For convenience, the higher retail prices that may be charged for products sold in slices are now included in the main schedule alongside the ordinary retail prices per lb. or per tin.

Other additions to the maximum prices, in respect of kosher foods, the use of sheep casings, ships' stores, non-specified sizes of tin, containers, breaking bulk, and delivery are on lines similar to the provisions in the old Order, except that on a first-hand sale of home-produced meat products an addition at a rate not exceeding ¼d. per lb. may be made to take account of the difference in the terms of delivery of imported and home-produced goods.

The present restriction on the use of soya is removed.

Bread and Flour Prices

The Bread Order, 1951, and the Flour Order, 1951, are being further amended so as to provide for the increase in the prices of bread and flour announced by the Chancellor of the Exchequer.

The price of bread will be increased at the rate of 1½d. per 1¾ lb. loaf. This means that the price of the 14 oz. loaf will be increased by ¾d. and the price of the 3½ lb. loaf by 3d.

The prices of flour (except semolina but including self-raising flour) sold otherwise than by retail, which are prescribed in Table I of Part I of the First Schedule to the Flour Order, 1951 (S.I. 1951, No. 1042), as amended by the Flour (Amendment No. 2) Order, 1951 (S.I. 1951, No. 2198), will be increased at the rate of 1¼d. per lb., that is, by 29s. 2d. per sack of 280 lb.

Adjustments will be made to the additions prescribed in Table II of Part I of the First Schedule to the Flour Order, 1951, as amended by the Flour (Amendment No. 2) Order, 1951, for sales by flour millers or importers to persons selling for export and for sales by flour millers and importers for export.

The maximum retail prices of flour (including self-raising flour) prescribed in the Schedule to the Flour (Amendment No. 2) Order, 1951, will be increased at the rate of 1¼d. per lb.

As a result of the increase in the price of flour, adjustments will be necessary in the price of cereal fillers, in the rate of the baking subsidy, and in the rate of the levy on biscuit manufacturers.

Cheese, and Cheese and Ham Spread

Following the withdrawal of the open general licence on March 12, 1952, the Ministry of Food, in agreement with the Board of Trade, announced the arrangements for the importation of certain varieties of cheese and of cheese and ham spread under individual licence during the period March 26 to May 15, 1952. The announcement also stated that consignments arriving between March 12 and 25, inclusive, would be released by H.M. Customs and Excise but that unless such imports were in transit to the United Kingdom before the open general licence was withdrawn on March 12, their value would be charged against the value of any licence that the importer might subsequently be granted.

To avoid any interruption of supplies, individual import licences for the period March 26 to May 15, inclusive, have had to be issued before the values of consignments imported between March 12 and 25 are known. The value of such consignments will accordingly be charged against the value of any licences granted after May 15.

Details of the arrangements for the importation of cheese and of cheese and ham spread after May 15, 1952, will be announced later.

Bread Subsidy

In view of the increase in the price of flour and in the maximum price of bread, the rate of bread subsidy will be increased by 2s. 2d. per sack in England, Wales, and Scotland and by 1s. 11d. per sack in Northern Ireland, with effect from May 11, 1952. The increase will be introduced on Bread Subsidy Claim Form No. 83 and will continue until further notice.

Information and Advice

This Service is available for subscribers to FOOD MANUFACTURE. Postal replies will be sent if a stamped, addressed envelope is enclosed with enquiries.

Apple Glucose for Jelly Tablets

B.5699. *Is apple glucose suitable for the manufacture of table jelly tablets?* (London.)

A recent analysis of apple glucose yielded the following figures:

Total solids	75·9
Reducing sugar	33·2
Sucrose	2·1
Dextrose	36·5

It can be used for jelly tablets as commercial glucose, except that allowances for solids have to be made. Commercial glucose is based on approximately 80 per cent. of soluble solids, apple glucose on approximately 75 per cent. Some Dutch glucose has been imported with only 65 per cent. of soluble solids. It is therefore essential to ascertain the solid content before commencing manufacture.

Marzipan

B.5703. *Could you please let us have some details of the manufacture of marzipan.* (Canada.)

The following formula is submitted as a basis for trial:

Granulated sugar	60 lb.
Corn syrup	14 ,,
Ground almonds	30 ,,
Fondant	14 ,,
Glycerine	4 fl. oz.
Almond oil	¼ ,, ,,

The almonds are sorted, blanched, and refined, and placed in a U-shaped mixing machine. The sugar and corn syrup are cooked in a steam pan to 250°F. The cooked batch is poured on the ground almonds, and the fondant and glycerine added.

After allowing to mix thoroughly, the batch is cooled and passed through the refiner. The marzipan may be rolled into sheets of any desired thickness and cut into bars which are crystallised. Alternatively, the paste may be worked into mosaic patterns and drawn out after the fashion of boiled sugar batches into variously shaped rods, which are cut into pieces on a guillotine, then crystallised in syrup at 34° Baumé for 6 hours.

Conditioning Meat

B.5692. *Could you please give us some information concerning the conditioning of meat.* (Hunts.)

In the United States controlled conditioning frequently forms part of the normal practice; in some cases light rays are employed to ensure surface sterilisation, thus enabling higher temperatures to be used without the risk of surface contamination.

The tenderness of a joint is associated with the activity of the muscles in question in the live animal, and consequently the amount of connective tissue they contain. This connective tissue is composed of a tough substance, collagen, which can be made into a tender substance, gelatine, by boiling. This change is greatly accelerated in the presence of lactic acid; it is obvious, therefore, that the formation of lactic acid in the muscle contributes considerably to tenderness.

It has been found that with efficient conditioning a great increase in the tenderness can be produced; this increase is more pronounced in coarse meat than in the better cuts. The demand for chilled beef is probably greatly influenced by the tenderness brought about during transit; in fact, to a modified extent, the popularity of Scotch beef can be attributed to a similar cause.

The average butcher in this country has a rooted objection to placing meat in a cold chamber immediately following slaughter, although no logical reason is given for this objection. It is appreciated that in some smaller slaughterhouses where roller bars are not available, carrying hot quarters would probably upset the fat, but even in centres where modern equipment is to hand, hanging over-night in atmospheric temperature is commonly employed.

The following is a suggested outline for conditioning meat previous to cutting or removal from the store:

1. The dressed carcass should be held at 34°-36°F. for six days.
2. The dressed carcass should be held at 36°-38°F. for two days.
3. The dressed carcass should be held at 40°-45°F. for one day.

The latter temperature would be preferable during the summer months.

This could be reasonably modified to suit the requirements of retail traders. The two precautions to be meticulously observed are steadiness of temperature and the prevention of influx of humid air by opening the chamber unnecessarily.

Lemonade Crystals

B.5706. *Could you help us by supplying us with a formula for lemonade crystals.* (S. Africa.)

The following is suitable for lemonade crystals for making still lemonade and should be used as a basis for trial:

Castor sugar	95¾ lb.
Tartaric acid	4¼ ,,
Colour	4 oz.
Lemon oil	4 ,,

The sugar and the tartaric acid are well mixed together and the colour and flavour added. The addition of a small quantity of soluble starch assists materially in the production of a non-sticky, free-running article as it helps to absorb the colour and flavour, but it is liable to produce a slight cloudiness in the final liquid.

The colouring matter used should be dissolved in water to full strength and should then have added to it about 50 per cent. of glycerine. The mixture should be sieved and bottled without delay.

Information Supplied

The Enquiry Service has dealt with requests for the names of manufacturers and suppliers of plant, machinery, and materials, and also general information as follows:

B.5616. *Palm kernel oil.* (London.)

B.5669. *Aluminium foil cups.* (Canada.)

B.5675. *Gelatine as a stabiliser.* (Northumberland.)

B.5688. *Liquid egg packing.* (London.)

B.5689. *Kieselguhr.* (Herts.)

B.5690. *Fruit peeling machines.* (Philippine Islands.)

B.5694. *Deep freezing.* (Hants.)

B.5696. *Flexible hose.* (London.)

B.5698. *Fruit and vegetable canning.* (N. Ireland.)

Information Required

B.5712. *Name and address of the manufacturers of "Tomlinson's Egg Preserver."* (Surrey.)

Recent Patents

670,072. ALUMINIUM CO. OF AMERICA: Lined closures for containers such as bottles or cans and methods of application thereof.
670,108. BRITISH CELLOPHANE, LTD.: Production of moistureproof sheet wrapping material.
670,135. QUAKER OATS CO.: Apparatus for packaging granular material.
670,217. SALERNO, G. F.: Packaged food product and a method of packaging food products.
670,294. BAKER PERKINS, LTD.: Biscuit ovens.
670,370. HAMMOND ENGINEERING CO., LTD., RUBERY, J. M., and HOY, F.: Dough handling machines.
670,438. ROHM AND HAAS CO.: Treating sugar solutions.
670,449. LENDERINK, J.: Process for the manufacture of foam producing albuminous products and their application in foodstuffs.
670,611. PAGE, A. C.: Method of and apparatus for automatically packing biscuits into tins and like containers.
670,795. SANDALL PRECISION CO., LTD., and BARKER, A. W.: Centre filling apparatus for use in the manufacture of sweets.
671,200. VERDIER, A. L.: Manufacture of chocolate.
671,329. LORINEZ, L.: Process for preparing a preserved food product from coconuts.

Abstract of a Recent Specification

Egg Substitute

It has already been proposed to produce an egg substitute by making milk protein containing products, which may be in part evaporated, more viscous through addition of viscosity-increasing, or colloid-forming, substances and by simultaneously lowering the *p*H value of the mixture by adding an acid substance, for instance sour whey, whereupon the mixture is converted into dry form by an appropriate method, such as by spray-drying or roller-drying. Such a dry product can be used with advantage in place of egg yolk in cooking. It has also been proposed to add nutritive and digestive components, such as flour or albumen, during any step in a process for the preparation of a milk product by evaporation.

Experiments carried out lately have revealed that the quality of this product may be further improved. The effect of the added acid substance seems to be to promote a coupling of the milk proteins with the carbohydrates or the proteins of the bread or other food being baked or cooked, such coupling occurring particularly at elevated temperatures.

Through this symplex-formation the stability and strength of the baked or cooked product is increased so that the grid structure, or porosity, thereof brought about by the vapours or gases developed during the baking or cooking process is maintained also when the product is cooled, and the latter therefore shows no tendency to sink down.

Because the acid substance is added before the mixture is converted into dry form, *i.e.* while the same contains water, symplex-formation may occur already on the drying roller or in the spraying device in which the mixture is dried, causing a premature symplex-formation between the milk proteins and the viscosity-increasing or colloid-forming substances of the mixture itself so that the capability of the dry product to promote the desired symplex-formation in the baker's ware or other food, in which it is used as an egg substitute, is impaired.

In order to eliminate this drawback it is proposed to proceed in such a manner that the viscosity-increasing or colloid-forming substance and the acid substance, which latter is added in such an amount only that the *p*H value of the final product in the presence of water will not be lower than 5·4, are kept out of simultaneous contact with the milk protein at elevated temperatures as long as any of the said three components is in an aqueous solution or suspension or in a humid state.

Elevated temperatures means temperatures above room temperature, *i.e.* above about 30°C.

661,089. *Svenska Mjölkprodukter Aktiebolag.*

Trade Marks

MAGAMP.—696,077. Apparatus for use in timing processes and for use in controlling machines and motors, all being electric apparatus operated by current control, voltage control or phase control; and relays and signal translating devices used in such apparatus. **The English Electric Company, Limited,** Queens House, 28, Kingsway, London, W.C.2; Electrical and Mechanical Engineers.
SAMMO.—696,605. Chewing gum. **William Gershon Rose,** trading as **Chix Chewing Gum,** 27, Kensal Road, Paddington, London, W.10; Manufacturer and Merchant.
FOX'S.—696,806. Boiled sugar confectionery (non-medicated). **Fox's Glacier Mints, Limited,** 46, Oxford Street, Leicester; Manufacturers and Merchants.
COLDCROPS. — 697,340. Fish, crustacea, meat, game and poultry, all being canned and preserved goods. **Coldcrops, Limited,** 23, Nork Way, Banstead, Surrey; Manufacturers and Merchants.
LONE TREE.—701,946. Fruits, vegetables, soups, and pickles, all being canned, preserved, or bottled goods. **Gibson and Company, Limited** (a Company incorporated under the laws of Kenya Colony), Mincing Lane, Nairobi, Kenya Colony, East Africa; Manufacturers and Merchants.
OPULUS.—702,356. Hams, poultry, meat products (for food for human consumption), fruits and vegetables, all being preserved, dried, canned, or bottled goods. **Augustus Allan Salisbury,** 6, Drapers' Gardens, Throgmorton Avenue, London, E.C.2; Merchant.
MERIDIO.—702,588. Canned tomatoes, canned tomato purée, canned tomato paste, and canned cherries. **A. J. Mills and Company, Limited,** Colonial House, Tooley Street, London, S.E.1; Merchants.
ISCOSORB.—702,722. Materials for stopping, packing, and insulating purposes, for sound deadening purposes, and for the prevention of radiation of heat. **The National Smelting Company, Limited,** 37, Dover Street, London, W.1; Manufacturers and Merchants.

Recent patents and trade marks have been selected from the "Official Journal of Patents" and the "Official Trade Marks Journal" and are published by permission of the Controller of H.M.S.O.

New Companies

Fasid Food Packing Company, Limited. (504609.) 48, St. John Street, Smithfield, E.C.1. Nom. cap.: £1,000 in £1 shares. Dirs.: Fanny Janes and Maureen R. Janes, Suite 12, 21, Seymour Street, W.1., and Anita Janes, 27, Bridge Court, Lea Bridge Road, Leyton, E.10.

Pan American Food Company, Limited. (504634.) To carry on business of merchants, importers and exporters of and dealers in foodstuffs, edible products, and produce of the soil, etc. Nom. cap.: £5,000 in £1 shares. Dirs.: not named. Subs.: J. Elmassian, 123a, Queens Gate, S.W.7; J. Elmassian and J. Tertsakian, 64, Queen Street, E.C.4 (jointly).

Wessex Frozen Foods, Limited. (504697.) Commerce House, 6/8, Blagrave Street, Reading. To carry on business of manufacturers, packers, wholesalers, distributors, and retailers of ice cream, frozen confectionery, foods, etc. Nom. cap.: £5,000 in £1 shares. Dirs.: K. T. Blake, The Hatchgate Bakery, Burghfield, Berks.; Hetty L. M. Blake, Cotswold, St. Mary's Road, Mortimer, Berks.; E. E. Testa, and Ellen J. Boseley.

Tyne Industrial Overalls, Limited. (504729.) Nom. cap.: £100 in £1 shares. Dirs.: R. G. Curry, 71, Monkseaton Drive, Whitley Bay; W. J. Laing, 18, St. Bedes, East Boldon, Co. Durham; L. L. Golden, 22, Queen Anne Street, London, W.1.

Olivier Kerbiriou (Amalgamations), Limited. (504754.) Ibex House, Minories, London, E.C.3. To take over the undertakings of Olivier Kerbiriou (Covent Garden), Ltd., Olivier Kerbiriou (Liverpool), Ltd., Olivier Kerbiriou (Cornwall), Ltd., and Direct Importers (Fruit and Vegetables), Ltd., and to carry on business of importers, exporters, merchants, and brokers of and dealers in fruit, vegetables, etc. Nom. cap.: £100 in £1 shares. Dirs.: H. Kerbiriou, Jean Kerbiriou, and Betty H. Kerbiriou, all of 21, Avenue Road, London, N.W.18.

Industrial Roof Insulation Specialists, Limited. (504793.) 76, Woodland Gardens, Muswell Hill, London, N.10. Nom. cap.: £100 in £1 shares. Dirs.: C. G. Moscati, 76, Woodland Gardens, Muswell Hill, N.10; A. J. West, 5, Cherwell House, Church End, N.W.8; Adele Bronkherst, 39, Harman Street, Kingsland Road, N.1.

Richard Jones and Sons (Lye), Limited. (504797.) 77, Cemetery Road, Lye, Stourbridge, Worcs. To take over business of a pikelet and muffin manufacturer formerly carried on by the late Richard Jones at Lye, Worcs., as "Richard Jones." Nom. cap.: £12,000 in £1 shares. Permt. dirs.: R. S. Jones, Four Winds, Greyhound Lane, Norton, Stourbridge; W. E. Jones, Rosslyn, 32, Pedmore Road, Lye; J. A. Jones, Sunfield, Vicarage Road, Wollaston, Stourbridge.

Jeffery's Ice Cream, Limited. (505058.) Trebursye, South Petherwin, Cornwall. To take over the business carried on at Trebursye, South Petherwin, as "Jeffery's Ice Cream" by F. Jeffery. Nom. cap.: £29,000 in £1 shares. Permt. dirs.: F. Jeffery and Mrs. V. M. Jeffery, both of Trebursye, South Petherwin, Cornwall.

From Jordan and Sons, Limited, Company Registration Agents, 116, Chancery Lane, London, W.C.2.